

**Mechanical
Engineering
Department
MCEG 1102**

**Introduction to
Mechanical Drawing
and Design Lab I**



Fall 2021

**Dr. Mingli Han
Dr. Chang Duan
Dr. Xiaobo Peng**

**PRAIRIE VIEW A&M UNIVERSITY
ROY G. PERRY COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
MCEG 1102 INTRODUCTION TO MECHANICAL DRAWING AND DESIGN LAB I
FALL 2021**

- I. COURSE DESCRIPTION IN ABET FORMAT**
- II ASSESSMENT RESULTS FOR CURRENT AND PAST THREE PERIODS**
 - Program Outcomes Assessed in Course**
 - Assessment Summary of Class Semester Averages for Outcomes**
 - End of Semester Course Outcomes Assessment Reports**
- III. TESTS**
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 - Original Test Questions & Master Solution/grading scheme used**
 - (Summary of topics can be a separate page or include on the assignment itself)**
 - Above Average (Graded original work)**
 - Average (Graded original work)**
 - Below Average (Graded original work)**
- IV. HOMEWORK ASSIGNMENTS**
 - Summary of Topics Covered by Homework Assignments**
 - Above Average (Graded original work)**
 - Average (Graded original work)**
 - Below Average (Graded original work)**
- V. PROJECT**
 - Summary of Topics Covered by Course Project**
 - Above Average (Graded original work)**
 - Average (Graded original work)**
 - Below Average (Graded original work)**

I. Course Description in ABET Format

MECHANICAL ENGINEERING DEPARTMENT MCEG 1102 Introduction to Mechanical Engineering Drawing and Design Lab I

1. Course number and name:	MCEG 1102 Introduction to Mechanical Engineering Drawing and Design Lab I
2. Credits and contact hours:	1 credit hour
3. Instructor's or course coordinator's name:	Dr. Chang Duan
4. Text book: Title:	Engineering Graphics Essentials
Author:	Kirstie Platenberg
Publisher, Year & Edition:	Schroff Development Corporation, 2010, 4 th Edition
a. Other Supplemental material	Gary R. Bertoline, Eric N. Wiebe, <i>Fundamentals of Graphics Communication</i> , Fifth edition, McGraw-Hill, 2005.
5. Specific course information	
a. Brief description of the content of the course (catalog description)	This course will require students to generate a master model and a set of design documents using solid modeling software.
b. Prerequisites or Co-requisites	None
c. *Indicate whether a required, elective, or selected elective (as per definition provided) course in the program	Required
6. a. Specific goals for the course specific outcomes of instruction (e.g. The student will be able to explain the significance of current research about a particular topic.)	b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.
Students will be able to :	The specific goals for the course specific outcomes listed on the left column will address the following student learning outcomes:
1. Create and edit solid models	
2. Create and modify drawings	
3. create and modify basic assembly structures	
	Outcome 2 An ability to apply engineering design to produce solutions

4. open-ended design of student's choice

that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factor (including use of the techniques, skills, and modern engineering tools necessary for engineering practice).

7 Brief list of topics to be covered

1. Introduction to the engineering drawing, design process, CAD/CAM system concept (1 classes)
2. Engineering technical drawing (2 classes)
3. Introduction to master model concept and Unigraphics software (1 classes)
4. Create and edit solid model solid modeling using Unigraphics (6 classes)
5. Create and modify drawings (2 classes)
6. Assembly of the parts (2 classes)
7. Analysis (1 classes)
8. Report writing (1 class)

***Required** courses are required of all students in the program, **elective** courses (often referred to as open or free electives) are optional for students, and **selected elective** courses are those for which students must take one or more courses from a specified group

II. ASSESSMENT RESULTS FOR CURRENT AND PAST THREE PERIODS

Program Outcomes Assessed in this course

Outcome 2:

An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factor.

Assessment Summary of Class Semester Averages for Outcomes

Outcomes	1
Semester	Semester Class Average (%)
Fall 2021	87.4
Fall 2020	81.8
Fall 2019	77.3
Fall 2018	84.6
Comments on Trend of Data	The Class Average is decreasing over the last three years.

*Expected Semester Class Average = 70% (or as defined by the program)

Ideal Semester Class Average = 75% (or as defined by the program)

End of Semester Course Assessment Reports Fall 2021 and Last Three Assessment Periods.

Each summary contains the following Information

1. Performance Statistics

- Total number of students in class
- The class average performance (**stated as %**) in each course outcome assessed in this class and the **two previous times course was assessed**.
- The acceptable class average for the class in each outcome area as set by your Department.
- Percentage of students who scored below the expected average in each outcome.

2. Implementation Summary

- Brief summary of plans implemented during the semester based on last assessment report

3. Perceived Problems

- Instructor's critical **evaluation** of perceived problems that affected students' performance. **Realistic problems should be identified throughout the semester and summarized in this section of the report.**

4. New Plans for Addressing Problems

- Instructor's plans for addressing the perceived problems the next time the class is taught. **These should be specific enough for another instructor to implement. Most of these should be things that, you, the instructor can implement to help students to improve. Be creative.**

5. Overall Trend over last three assessment periods

- Instructors summary of overall performance trend for each outcome measured over the last three periods.

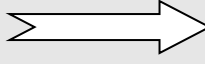
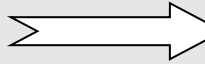
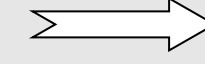
5. Were Expectations Met?

- Answer **YES** if the **class average was above the expected average** and the **stated percentage of students** scored at or above the expected average, else answer **NO**.

Table 2.1 END OF SEMESTER COURSE OUTCOME ASSESSMENT REPORT
MCEG 1102-P04 INTRODUCTION TO MECHANICAL ENGINEERING DRAWING AND DESIGN LAB I
FALL 2021 SEMESTER

Report Prepared by: Dr. Chang Duan

Report Date: December 17, 2021

Semester	Analysis Type	Number of Students	Outcome 2 an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors			
			Expected Class Average	Expected Percent of students at or above average	Class Average	% Students meeting Expected Average
Fall 2021	Direct	21	70	70	87.4	90.5
Fall 2020	Direct	13	70	70	81.8	76.9
Fall 2019	Direct	17	70	70	77.3	75
Fall 2018	Direct	12	70	70	84.6	83.3
Implementation Summary	Items implemented from previous report or after meeting previous instructor 		Extra learning tutorial are provided to students for the self-learning after class. TA sessions are made available to students.			
Perceived Problems	Perceived problems are directly related to the PC and the sub items under them 		More tutorials are needed for students to further their study. Freshmen needs constant reminder on deadlines. Students are weak in planning the modeling process of 3D models. Face-to-face mode helps to engage student better. Students who attended most classes performed well.			
Plans for Addressing Problems	Plans for address specific measures to address PC and their sub areas 		TA sessions are very helpful according to students. Initial setup for virtual desktop needs to be done as early as possible. On-going technical support is essential.			
Overall Trend over Periods	Ascertain if there were improvements over previous semesters 		The class average increased comparing to last year.			
Were Expectations Met?	Class Average ≥ 70 and $\geq 70\%$ of Students Performed at or Above Expected Average. 		YES			

***: ABET switched to outcome 1-7 in May 2018. Outcome e is assessed in Fall 2017 and before that. Outcome 1 is assessed in Fall 2018 and onwards.**

**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

Title of Assignment: Midterm Exam

TOPICS COVERED IN Midterm Exam

Midterm Exam covered the following topics:

1. Multi-view sketch
2. Solid Modeling

**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

**SAMPLE MIDTERM EXAM QUESTIONS, SOLUTION,
AND GRADING SCHEME FOR MIDTERM EXAM**

Total Grade:

Student Name (Print):

Midterm Exam

MCEG 1102 - P04

Fall 2021

Dr. Chang Duan

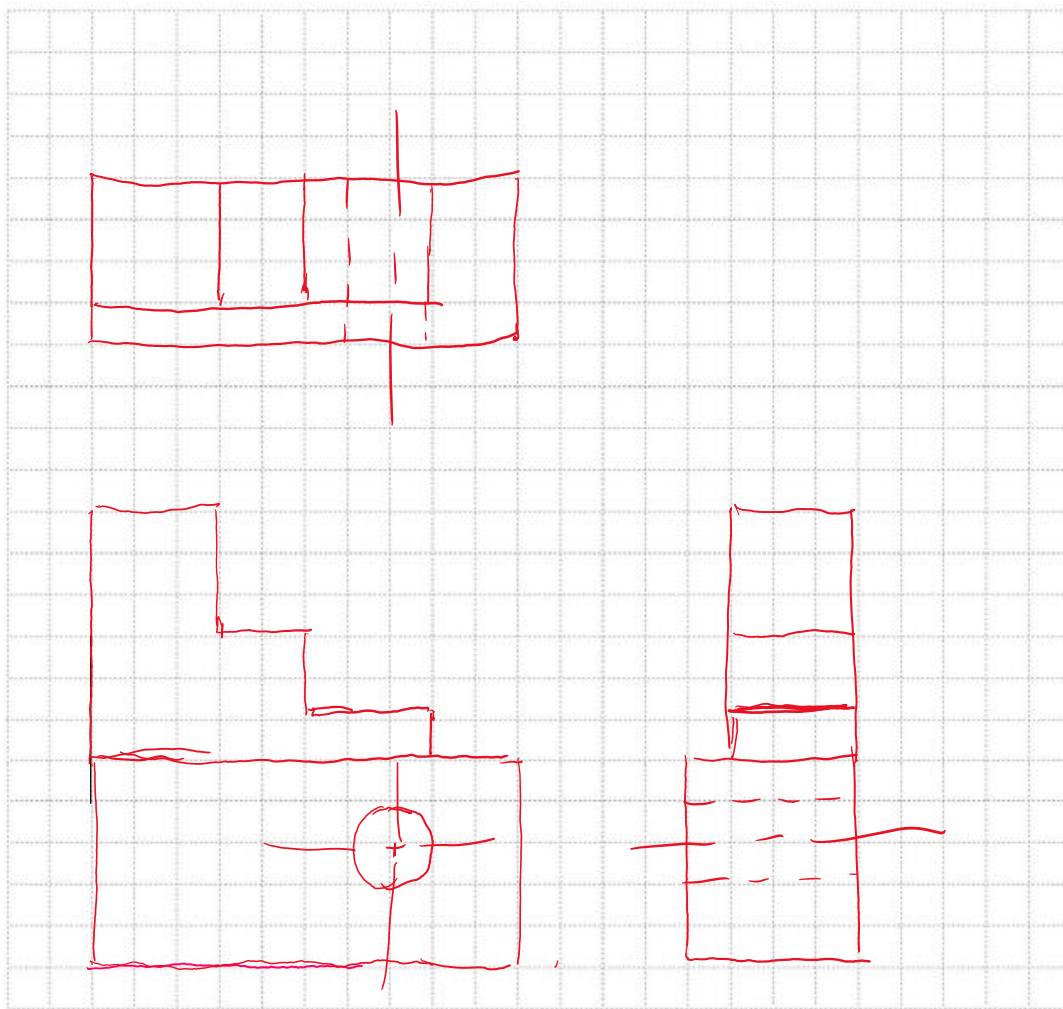
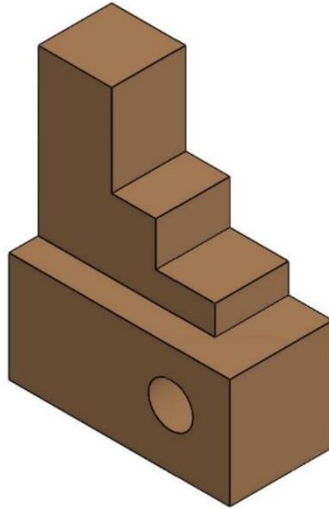
- Please stay on this page until you are asked to start the exam
- Closed book, closed homework, no internet except for logging on Ecourses, no USB drive, no cell phone during the exam. Only pen/pencil, eraser, ruler can be used in the exam.
- This exam has two parts:
 - Questions 1 (25 points) Paper-based test. Write you answer on the exam paper
 - Questions 2, 3, 4. (75 points) Computer-based test. Save your 3D models on the desktop and upload them onto the ecourses during the exam time. The submission page will be closed at 5:10pm.
- Write your name on all pages.

Note:

- Academic dishonesty of any sort (plagiarism, cheating, fabrication or facilitation) is prohibited under any circumstance. Any detected actions of dishonesty will cause the failure of the class immediately.

Student Name (Print):

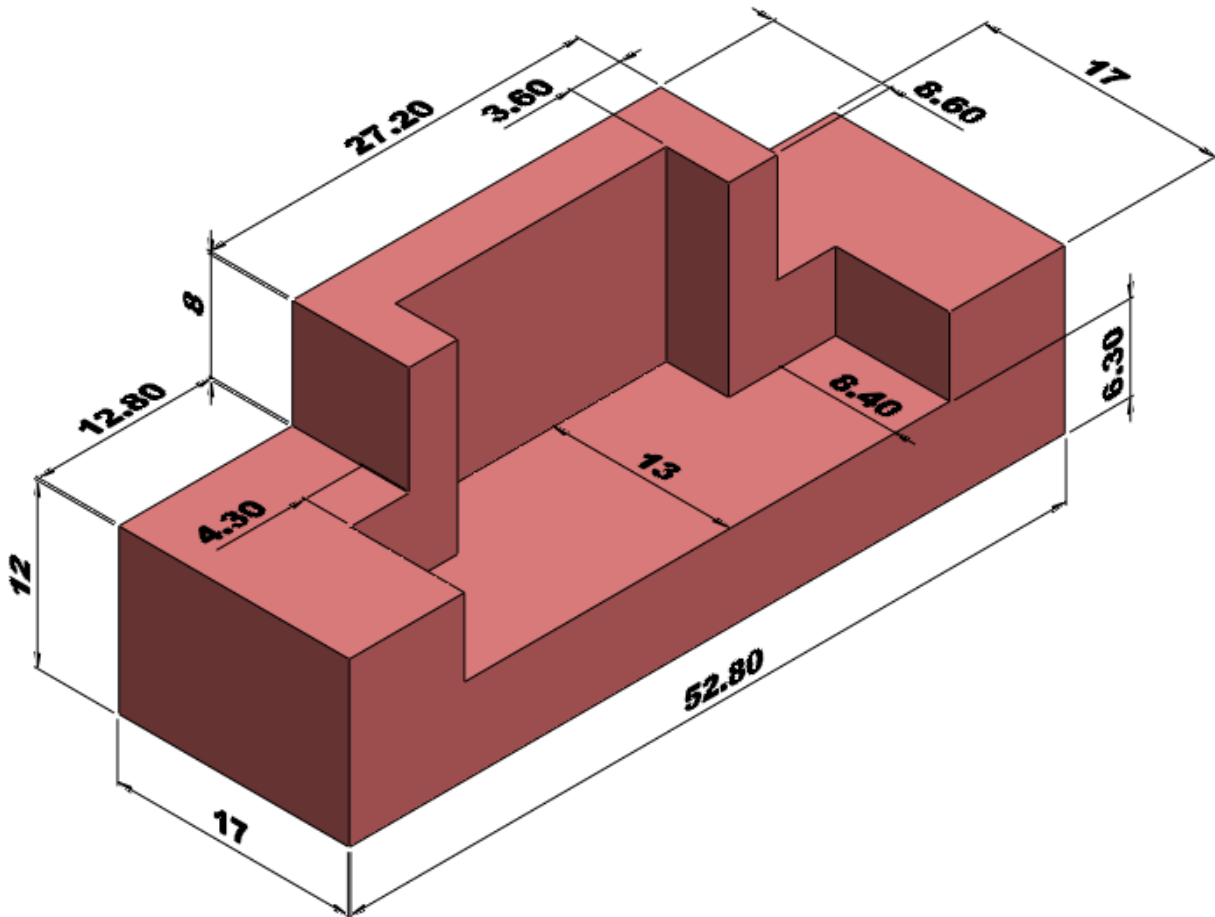
1. (25 pts) Sketch the front, top and right views of the following object. Use the grid provided.



Student Name (Print):

2. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

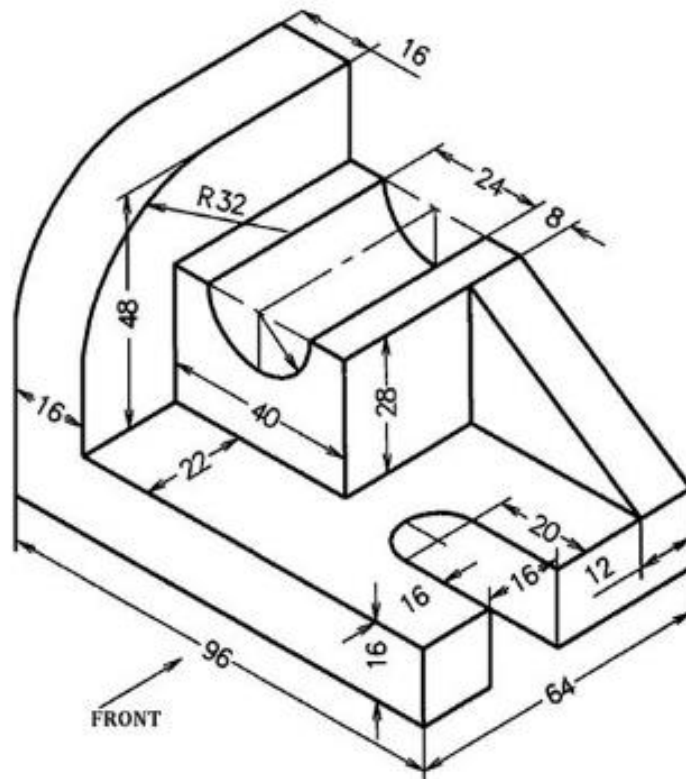
Note: Name the model as Midterm_P2_FirstName_LastName.prt. Submit the model on Ecourses.



Student Name (Print):

3. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is **mm**.

Note: Name the model as **Midterm_P3_FirstName_LastName.prt**. Submit the model on **Ecourses**.



ABOVE AVERAGE

PRAIRIE VIEW A&M UNIVERSITY

Total Grade:

100

Student Name (Print):

Kevin Biggers

Good work!

Midterm Exam

MCEG 1102 - P04

Fall 2021

Dr. Chang Duan

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- Write your name on all pages.

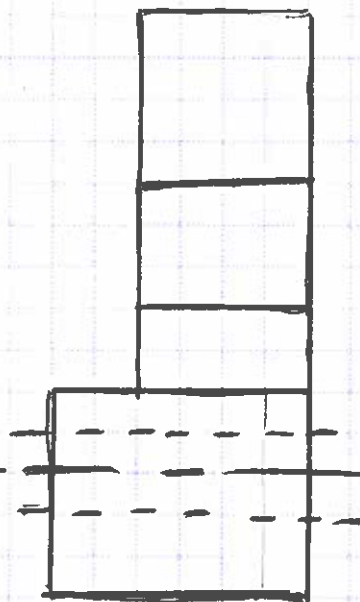
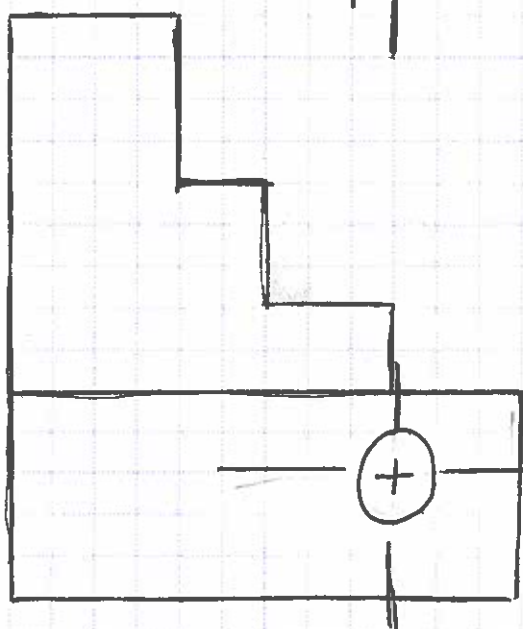
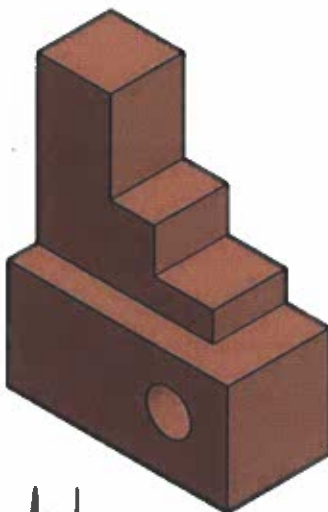
Note:

- Academic dishonesty of any sort (plagiarism, cheating, fabrication or facilitation) is prohibited under any circumstance. Any detected actions of dishonesty will cause the failure of the class immediately.

5:07 PM

Student Name (Print):

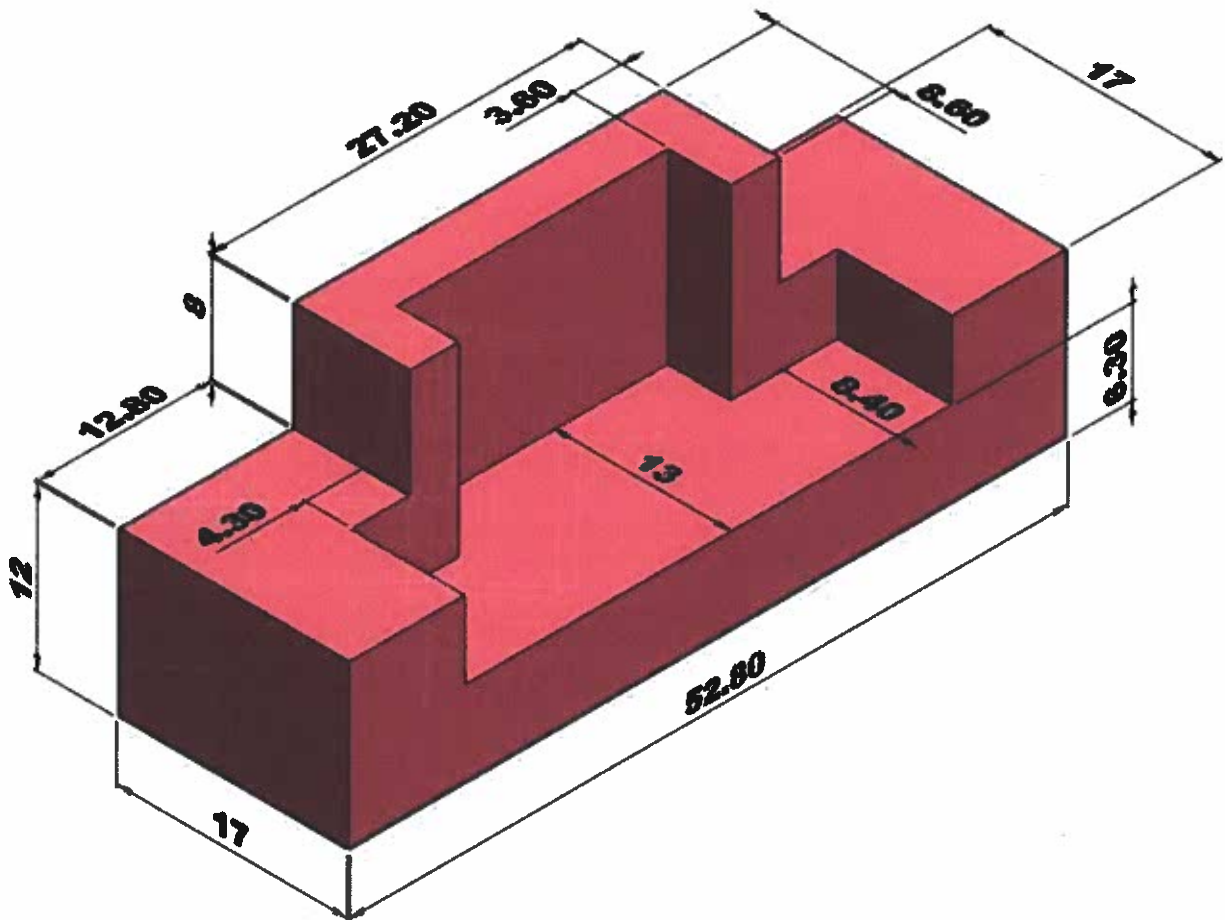
- 25 1. (25 pts) Sketch the front, top and right views of the following object. Use the grid provided.



Student Name (Print):

- 25 2. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

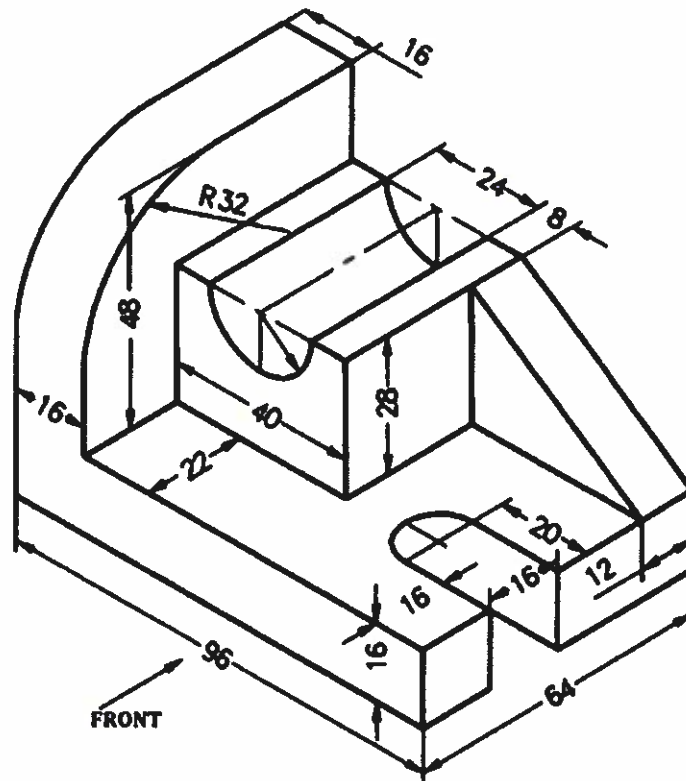
Note: Name the model as Midterm_P2_FirstName_LastName.prt. Submit the model on Ecourses.



Student Name (Print):

- 25 3. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

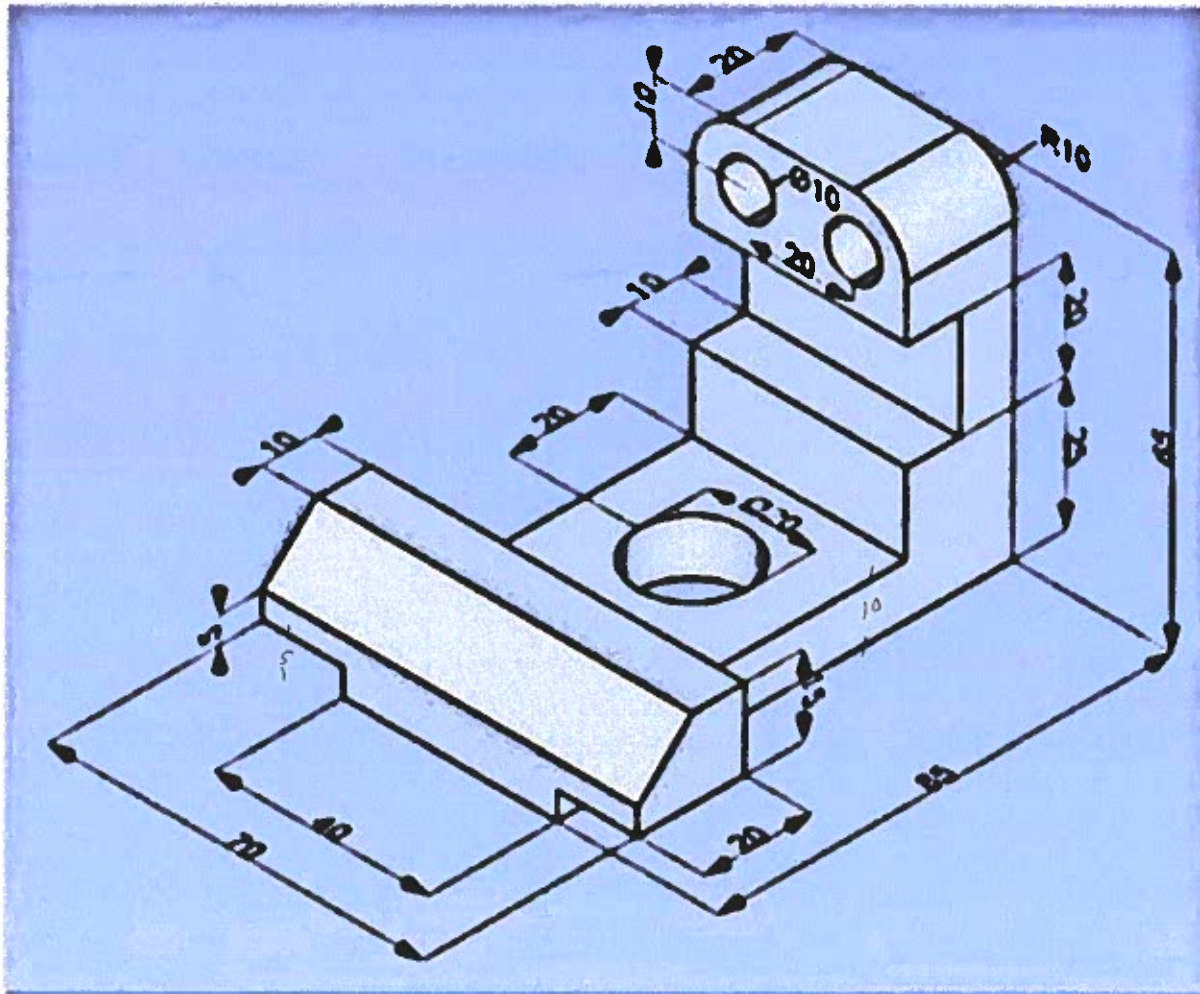
Note: Name the model as Midterm_P3_FirstName_LastName.prt. Submit the model on Ecourses.



Student Name (Print):

- 25 4. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

Note: Name the model as Midterm_P4_FirstName_LastName.prt. Submit the model on Ecourses.



AVERAGE

PRAIRIE VIEW A&M UNIVERSITY

Total Grade:

88

Student Name (Print):

Kyle Rodney

Midterm Exam

MCEG 1102 - P04

Fall 2021

Dr. Chang Duan

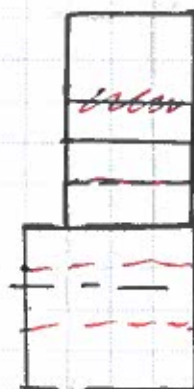
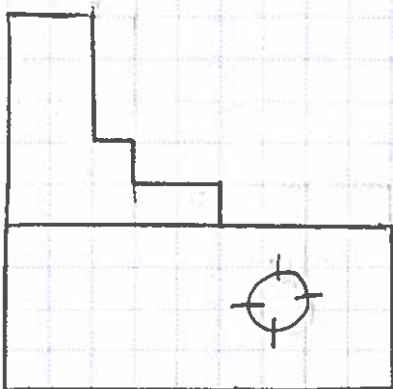
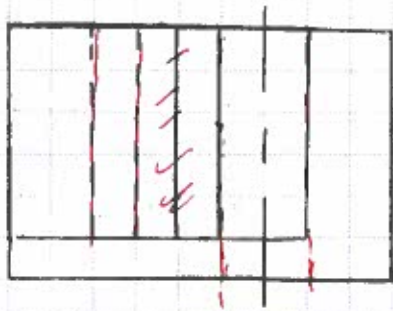
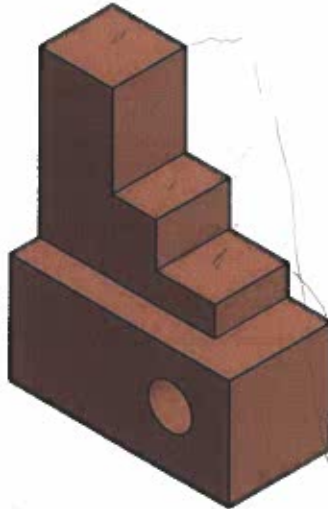
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- Write your name on all pages.

Note:

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Student Name (Print): Kyle Rodney

- 20 1. (25 pts) Sketch the front, top and right views of the following object. Use the grid provided.

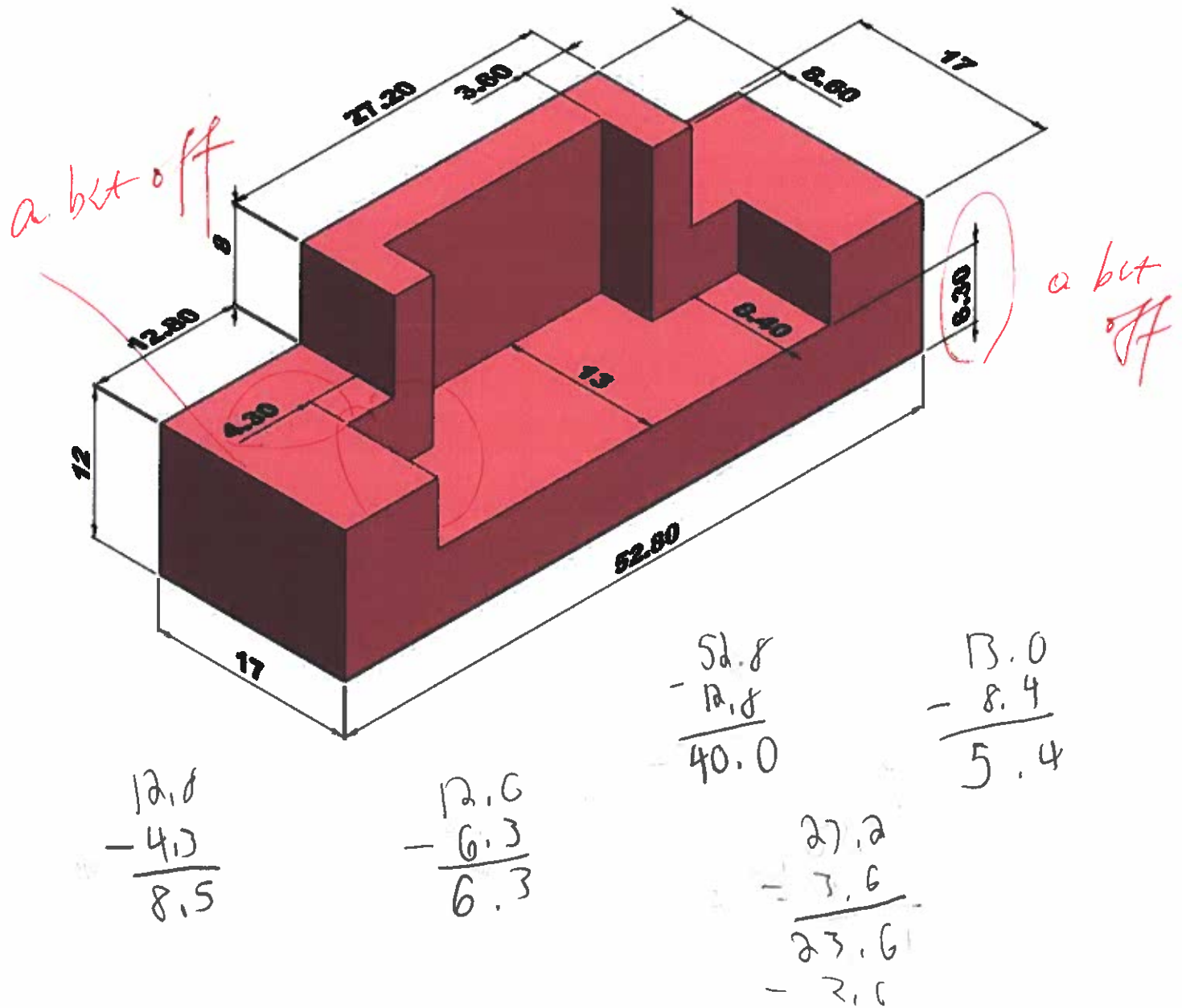


Student Name (Print): **Kyle Rodney**

23

2. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

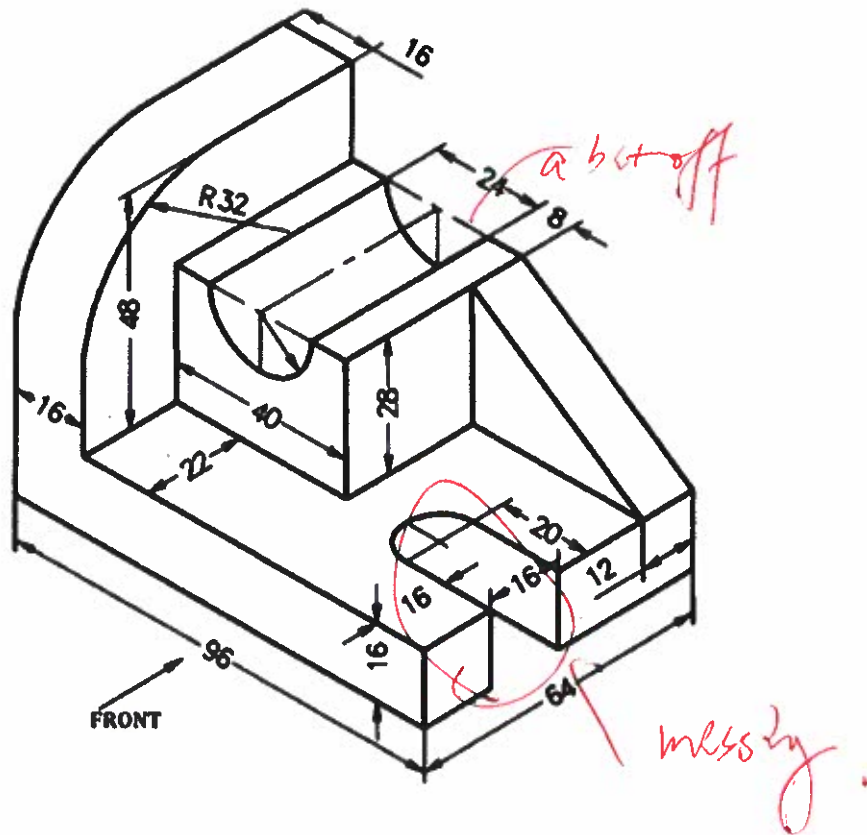
Note: Name the model as Midterm_P2_FirstName_LastName.prt. Submit the model on Ecourses.



Student Name (Print): Kyle Rodney

2/ 3. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

Note: Name the model as Midterm_P3_FirstName_LastName.prt. Submit the model on Ecourses.



$$\begin{array}{r} 96 \\ -40 \\ \hline 56 \end{array}$$

$$\begin{array}{r} 40 \\ +16 \\ \hline 56 \end{array}$$

$$\begin{array}{r} 64 \\ -22 \\ \hline 42 \end{array}$$

$$\begin{array}{r} 22 \\ +12 \\ \hline 34 \end{array}$$

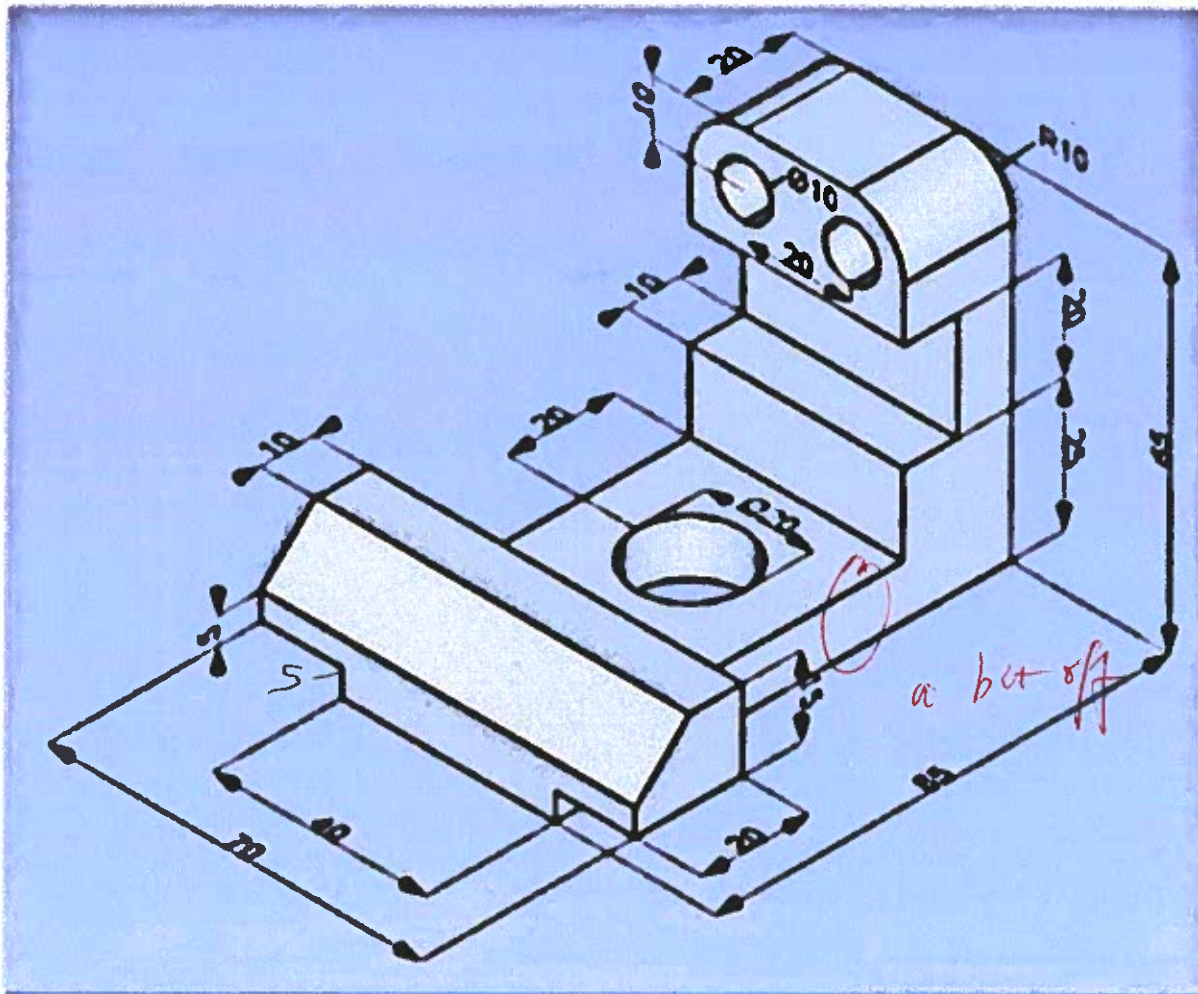
$$w = 42$$

$$\begin{array}{r} 64 \\ -12 \\ \hline 52 \end{array}$$

Student Name (Print):

24 4. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

Note: Name the model as Midterm_P4_FirstName_LastName.prt. Submit the model on Ecourses.



$$\begin{array}{r} 65 \\ - 45 \\ \hline 20 \end{array}$$

BELOW AVERAGE

PRAIRIE VIEW A&M UNIVERSITY

Total Grade:

71

Student Name (Print): Javon Priestley

Midterm Exam

MCEG 1102 - P04

Fall 2021

Dr. Chang Duan

- Please stay on this page until you are asked to start the exam
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- Write your name on all pages.

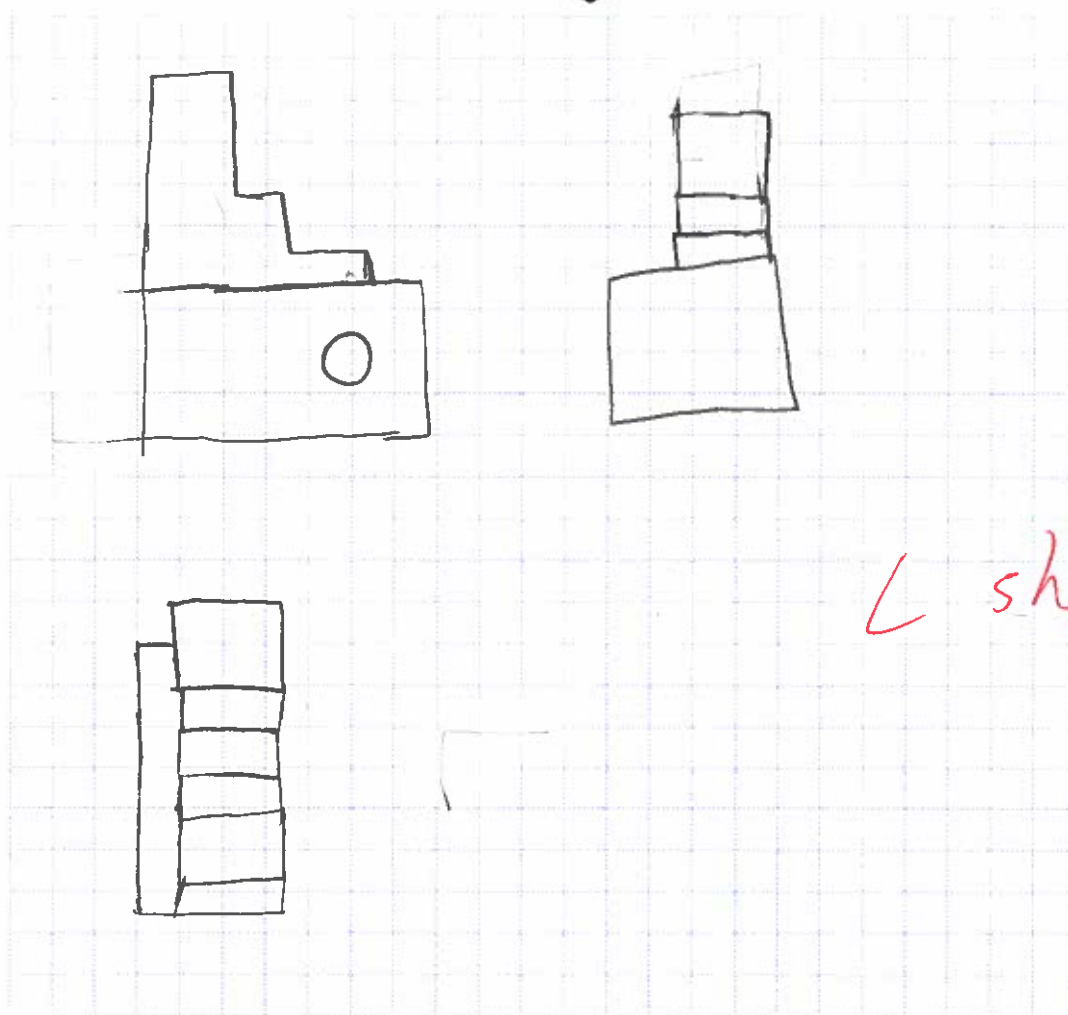
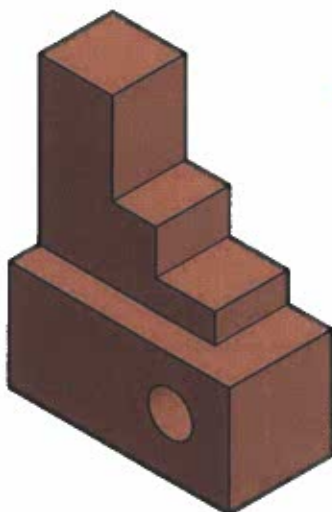
Note:

- Academic dishonesty of any sort (plagiarism, cheating, fabrication or facilitation) is prohibited under any circumstance. Any detected actions of dishonesty will cause the failure of the class immediately.

4:41 PM

Student Name (Print):

- 13 1. (25 pts) Sketch the front, top and right views of the following object. Use the grid provided.



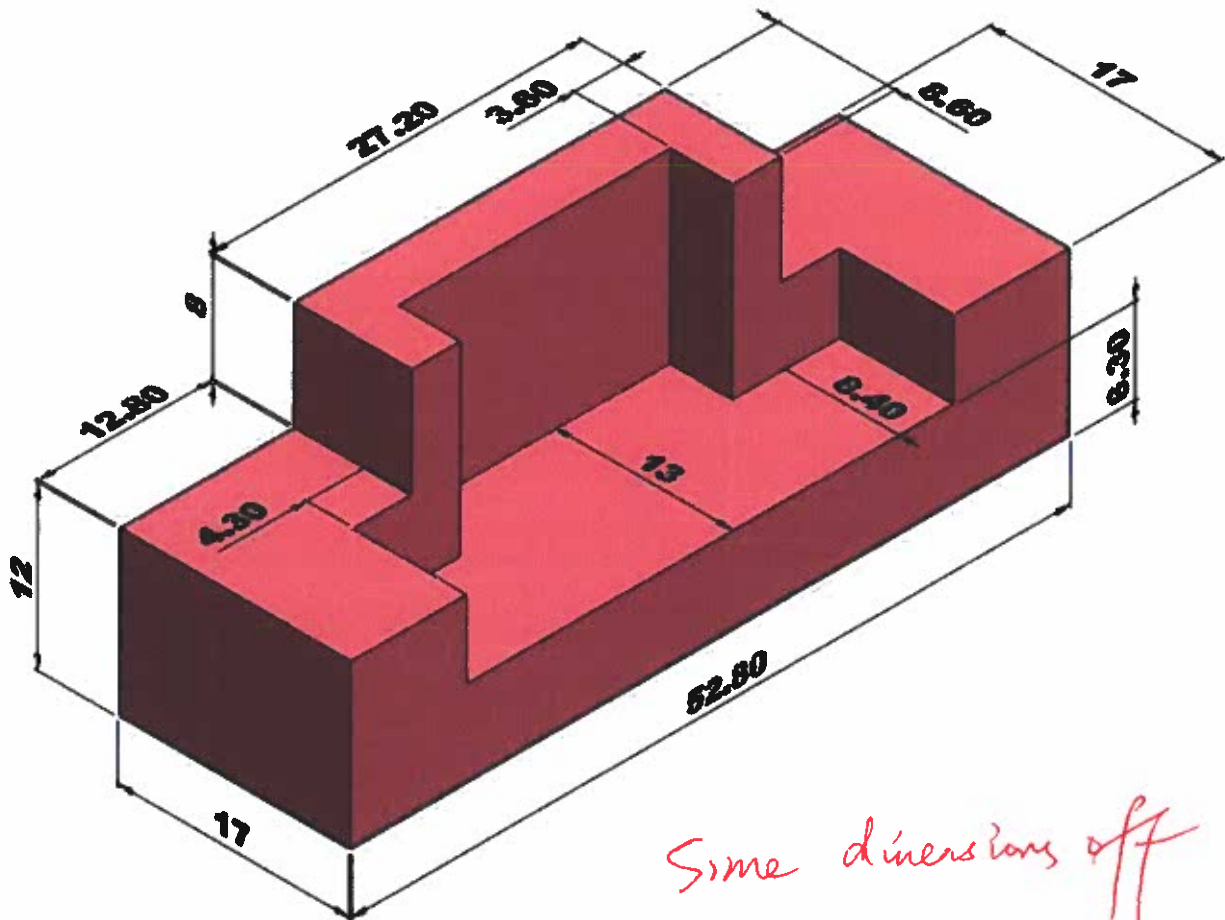
L shape

Student Name (Print):

19

2. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

Note: Name the model as Midterm_P2_FirstName_LastName.prt. Submit the model on Ecourses.

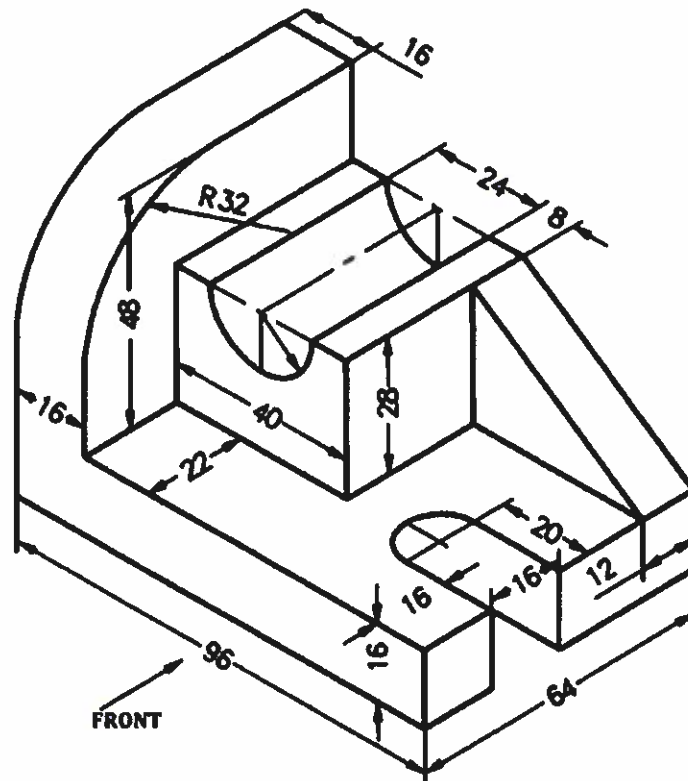


Some dimensions off

Student Name (Print):

20 3. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

Note: Name the model as Midterm_P3_FirstName_LastName.prt. Submit the model on Ecourses.

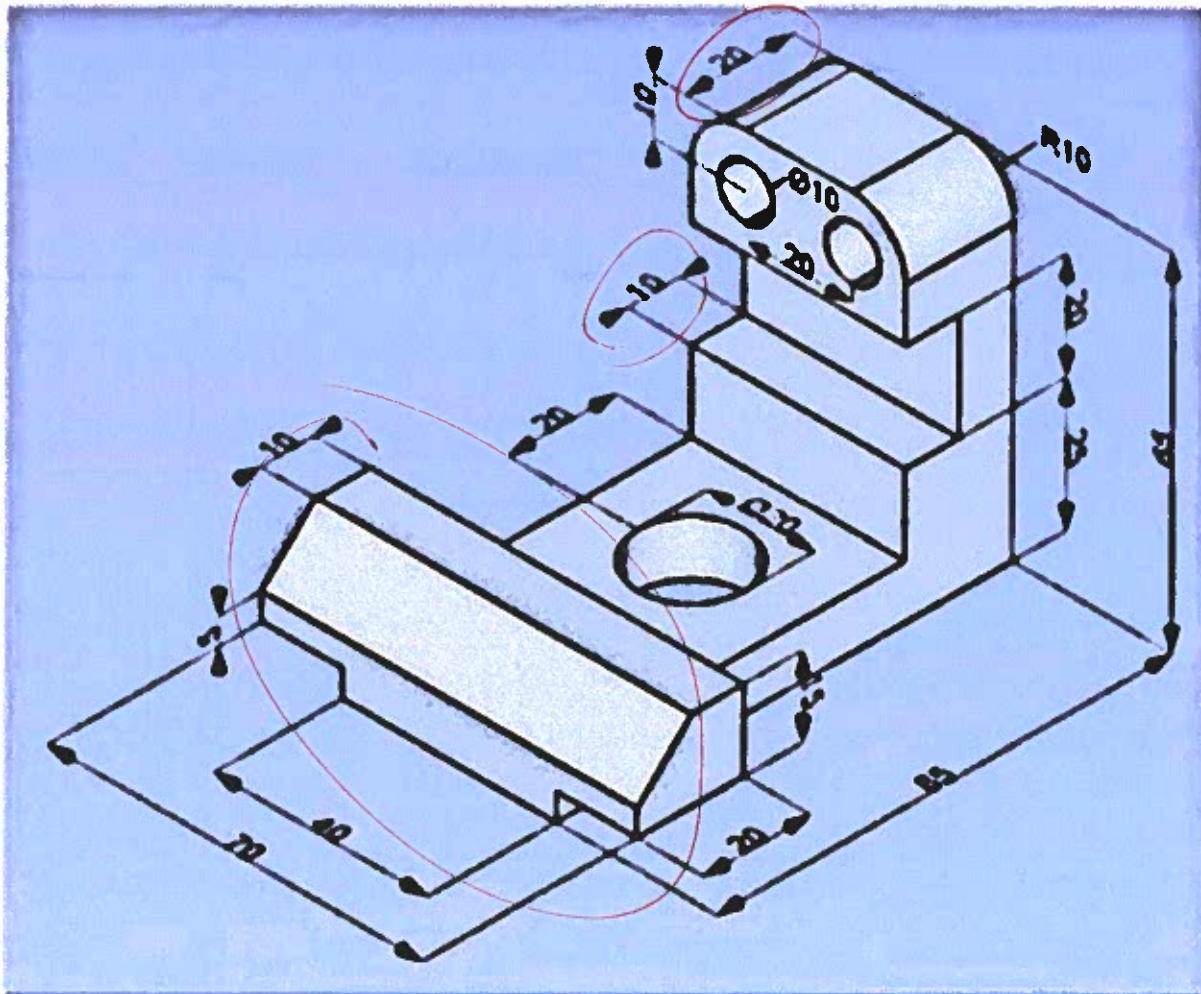


Some dimensions off

Student Name (Print):

19 4. (25 pts) Create the following 3D model using NX 10. Use the exact dimensions. The unit is mm.

Note: Name the model as Midterm_P4_FirstName_LastName.prt. Submit the model on Ecourses.



**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

Title of Assignment: FINAL EXAM

TOPICS COVERED IN FINAL EXAM

Final Exam covered the following topics:

1. Solid Modeling
2. Drafting

**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

**SAMPLE FINAL EXAM QUESTIONS, SOLUTION,
AND GRADING SCHEME FOR FINAL EXAM**

Total Grade:

Student Name (Print):

Final Exam

MCEG 1102 - P04

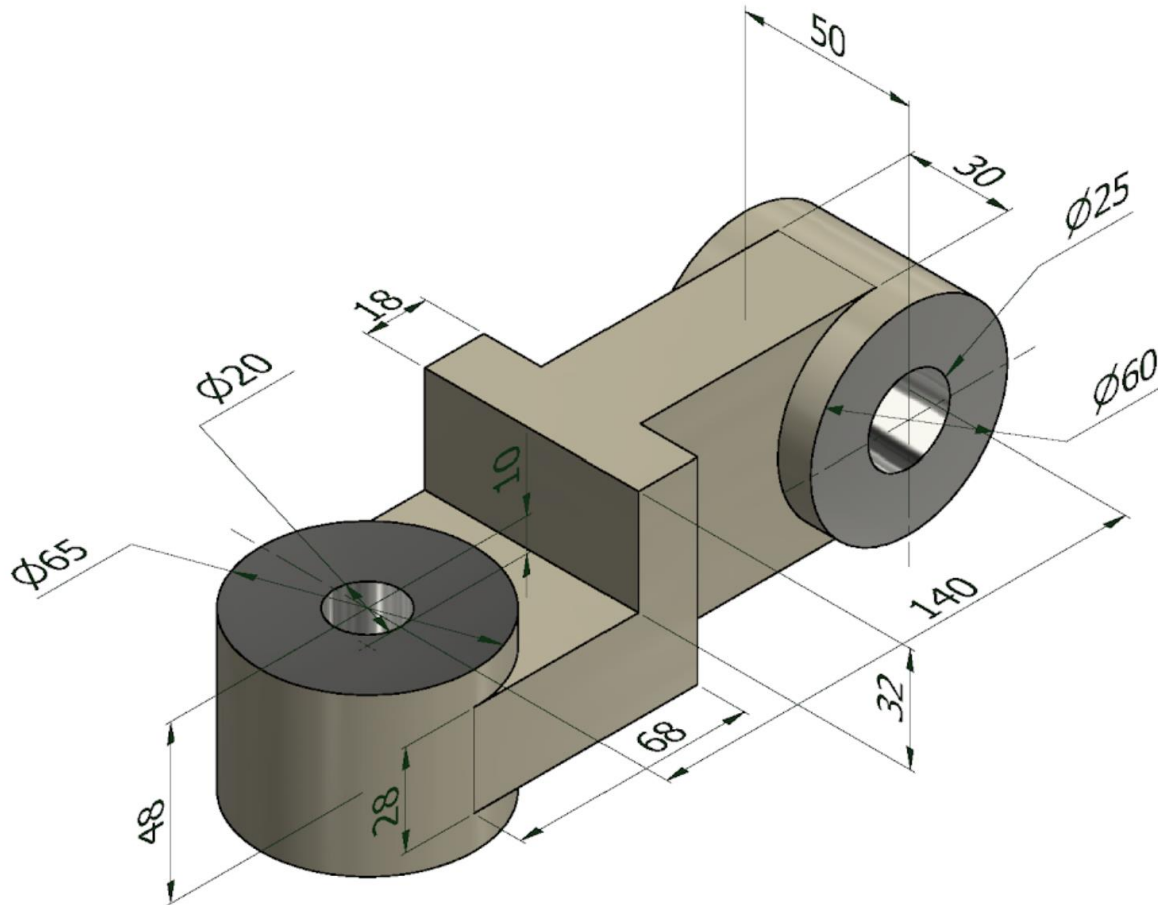
Fall 2021

Dr. Chang Duan

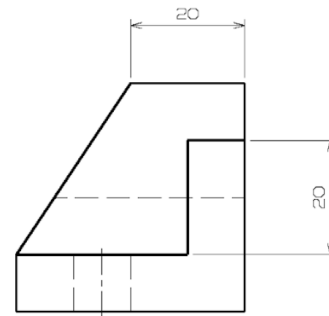
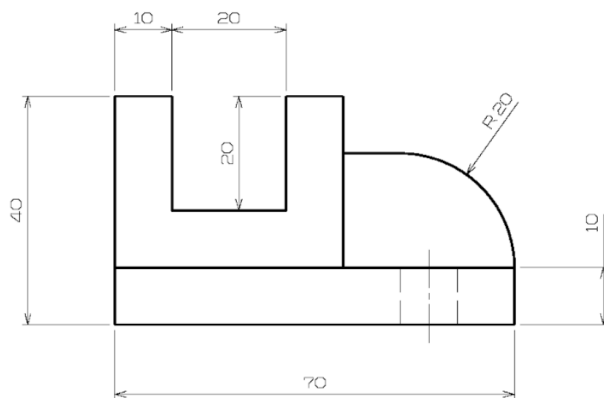
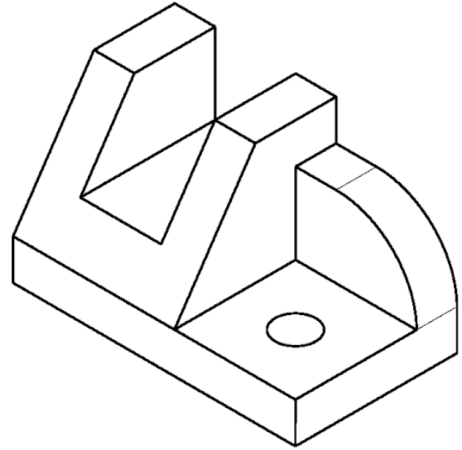
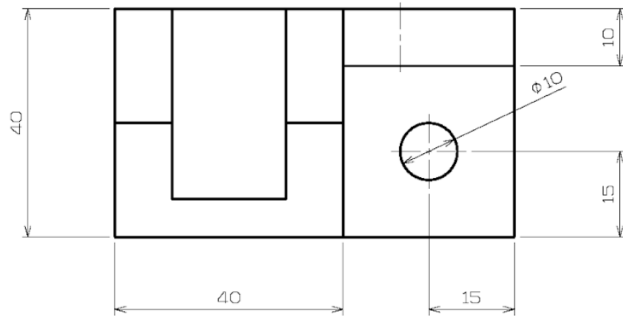
2:30 - 4:30 pm, 12/06/2021

- Please stay on this page until you are asked to start the exam.
- There are totally **four** questions. Each one has 25 points and the total point is 100.
- Closed book, closed homework, no internet except for Ecourses, no USB drive, no cell phone during the exam. Only pen/pencil, eraser, ruler and calculator can be used in the exam. No any types of print-out paper on the desk.
- This exam is a computer-based test. Save your 3D model or drafting on the desktop and **upload them onto the ecourses** during the exam time. The submission page will be closed at 4:30 pm.
- Any one minute late submission will result in a 10% penalty of the grade.
- Academic dishonesty of any sort (plagiarism, cheating, fabrication or facilitation) is prohibited under any circumstance. **Any detected actions of dishonesty will cause the failure of the class immediately.**

1. (25 pts) Create the following 3D model using NX. Use the exact dimensions. The unit is **mm**. Name the model as **P1_FirstName_LastName.prt**. Submit the model on Ecourses.

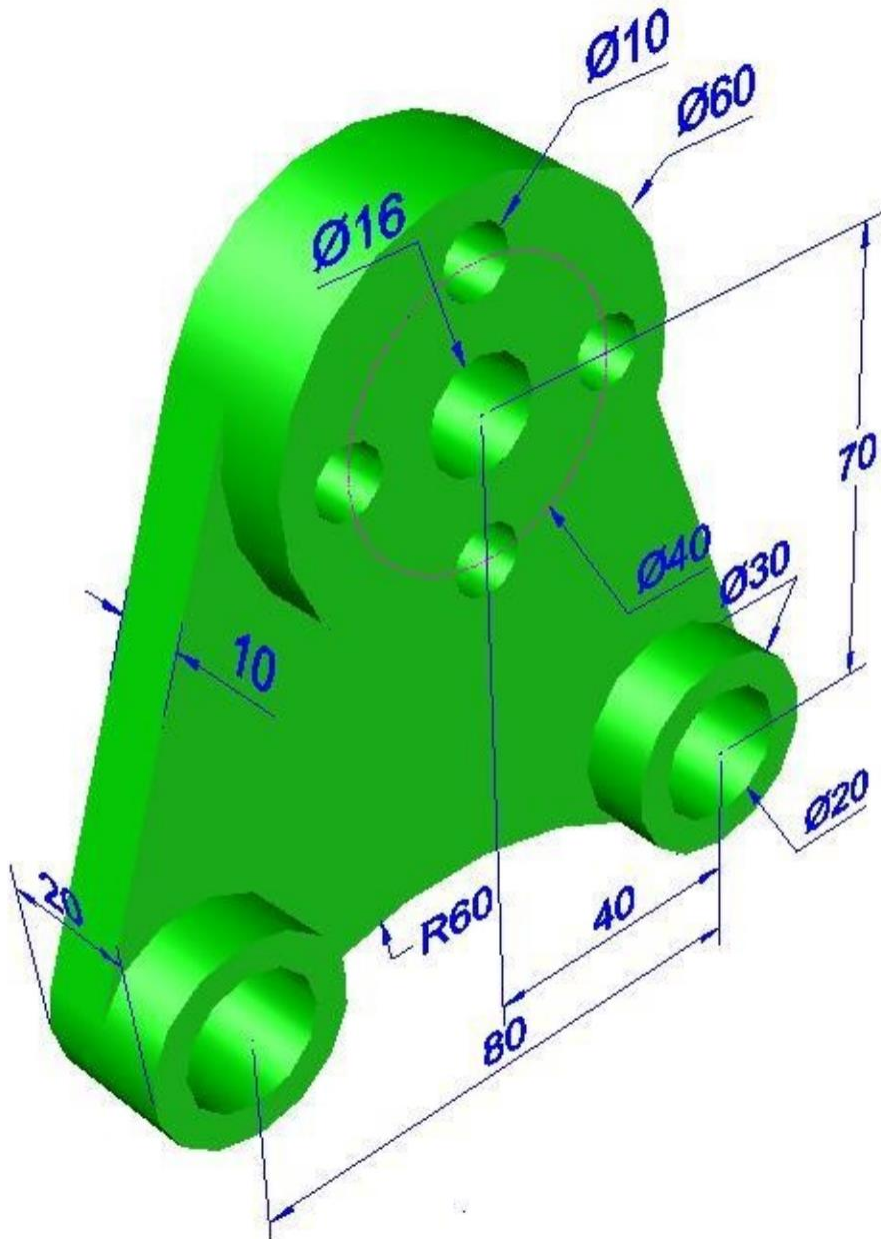


2. (25 pts) Create the following 3D model using NX. Use the exact dimensions. The unit is **mm**. Name the model as **P2_FirstName_LastName.prt**. Submit the model on Ecourses.



3. (25 pts) Create a drafting in NX, based on the model created in Question 2. All lettering should be horizontal (not as shown in Question 2). Name the drafting as **P3_FirstName_LastName.prt**. Submit the drafting on Ecourses.

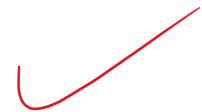
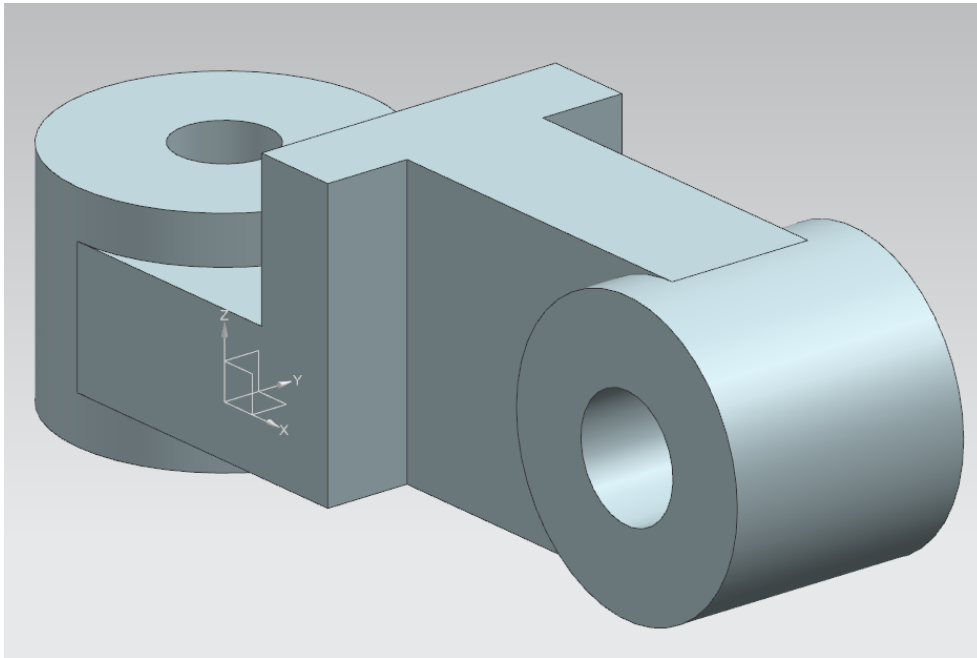
4. (25 pts) Create the following 3D model using NX. Use the exact dimensions. The unit is mm. Name the model as **P4_FirstName_LastName.prt**. Submit the model on Ecourses.



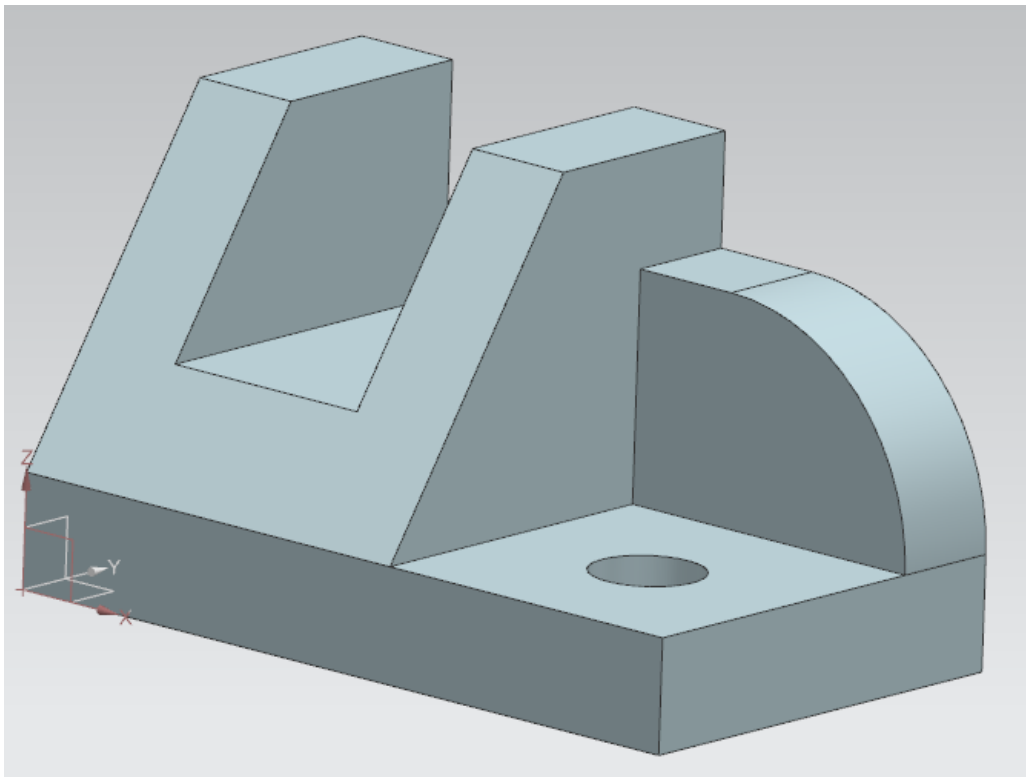
ABOVE AVERAGE

100

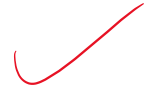
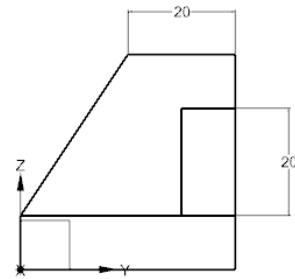
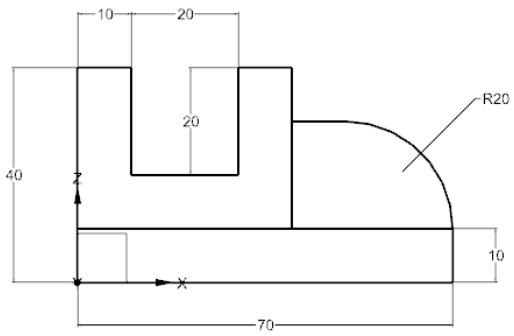
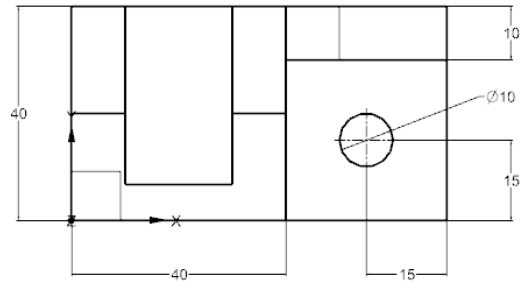
P1.



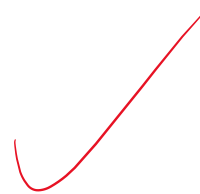
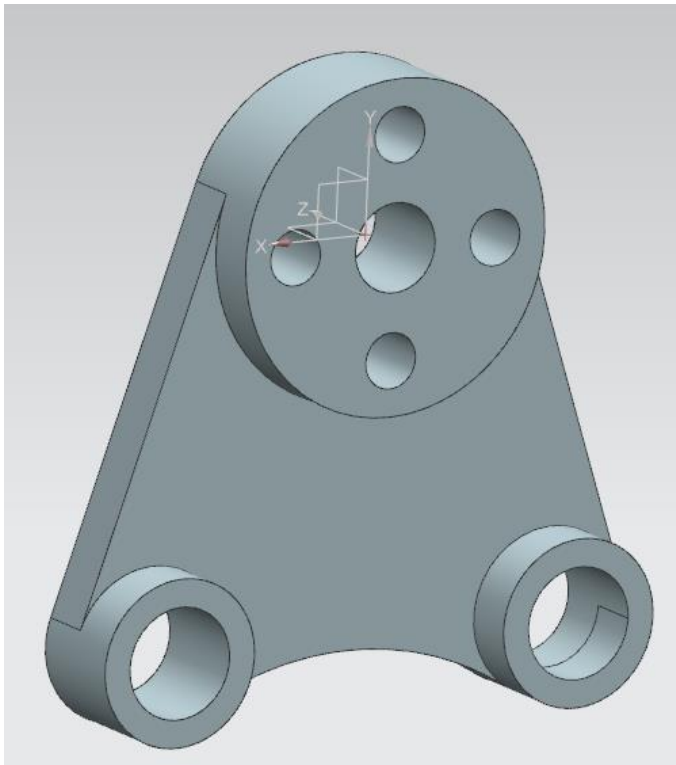
P2.



P3.



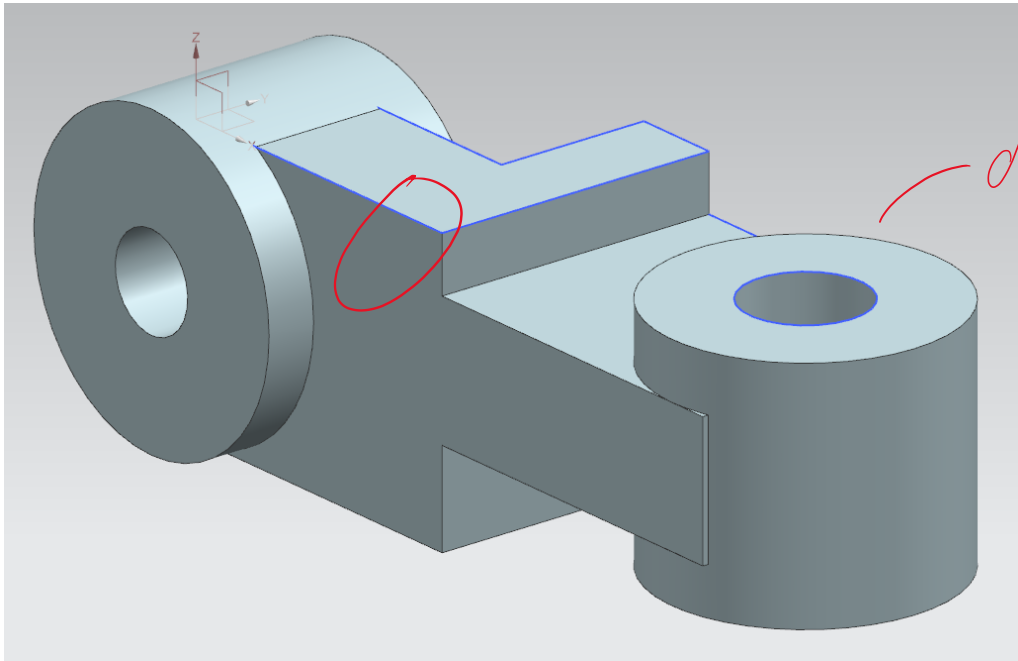
P4.



AVERAGE

88

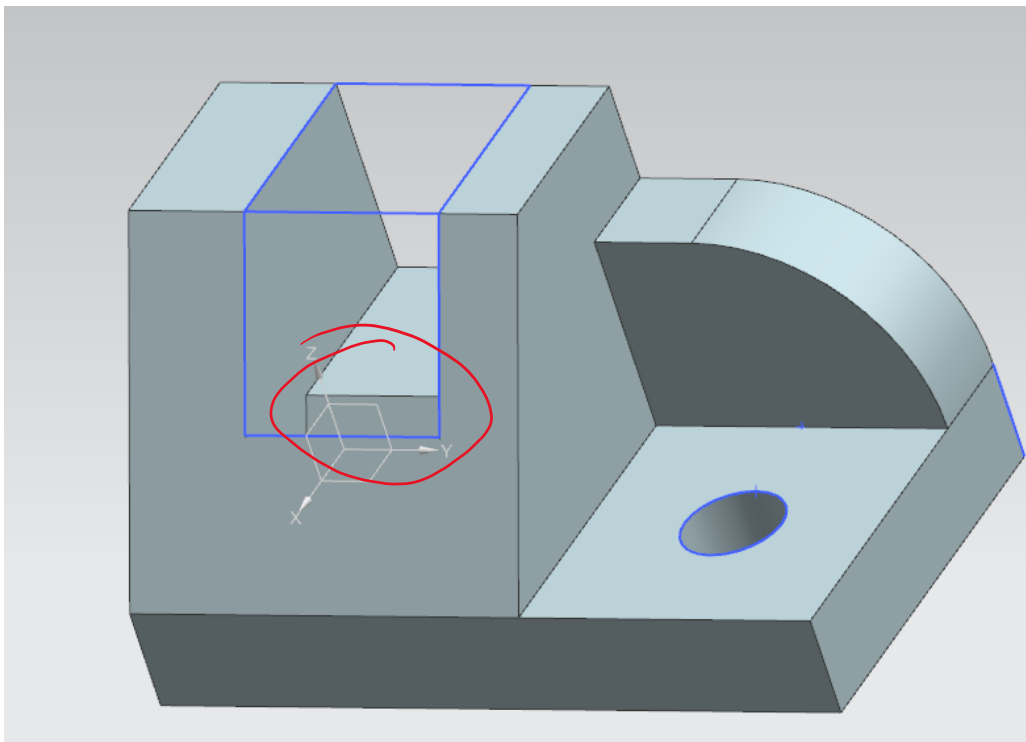
P1.



dimension off

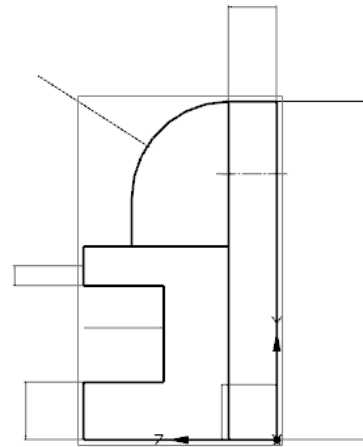
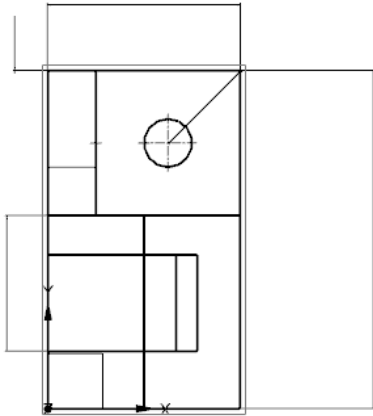
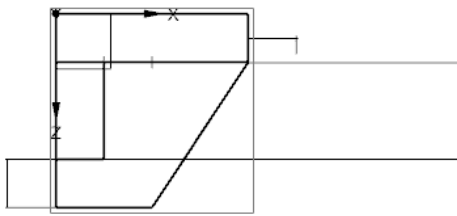
-3

P2.



-2

P3.

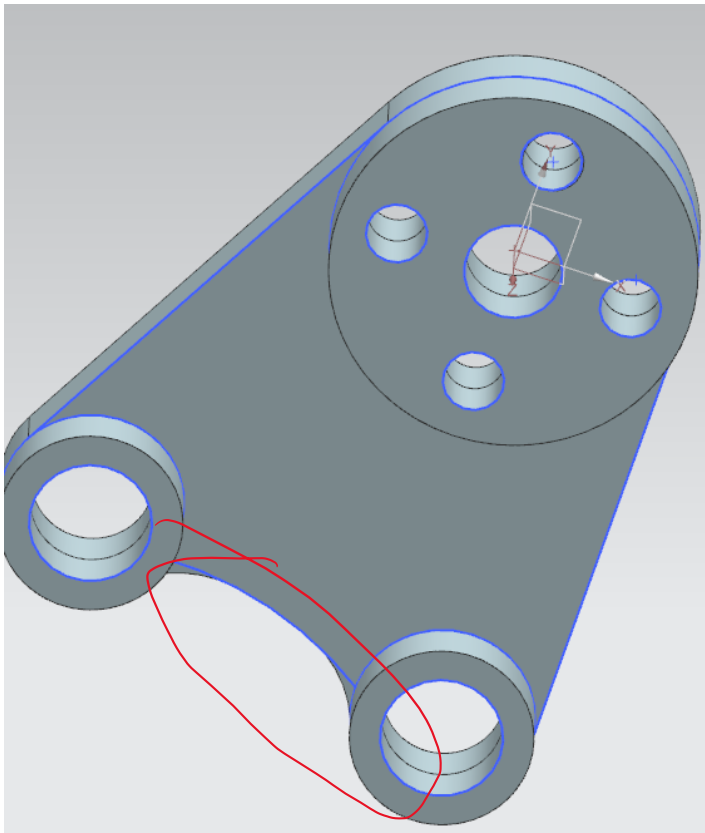


Orientation

font size.

- 6

P4.

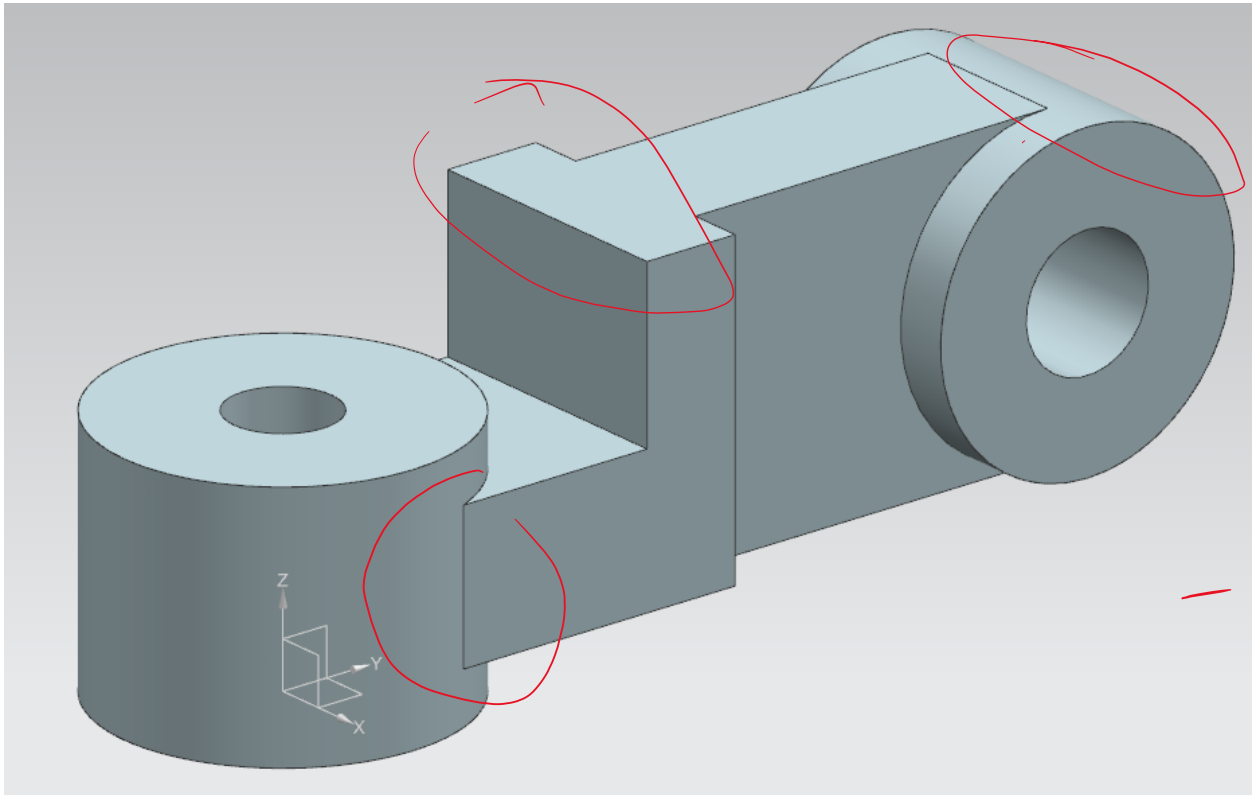


- 1

BELOW AVERAGE

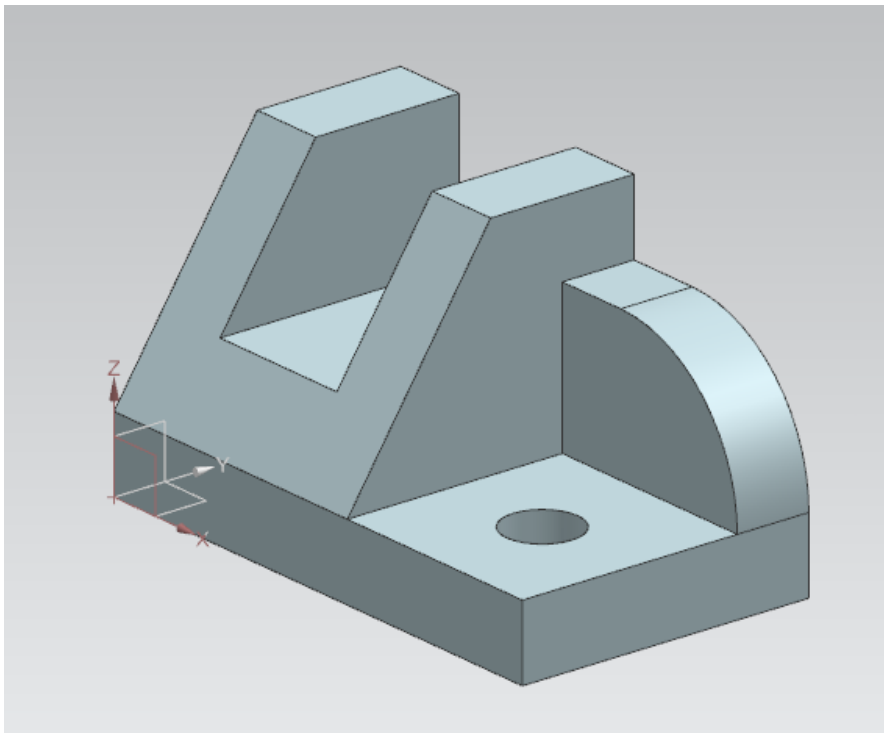
P1.

70



- 4

P2.

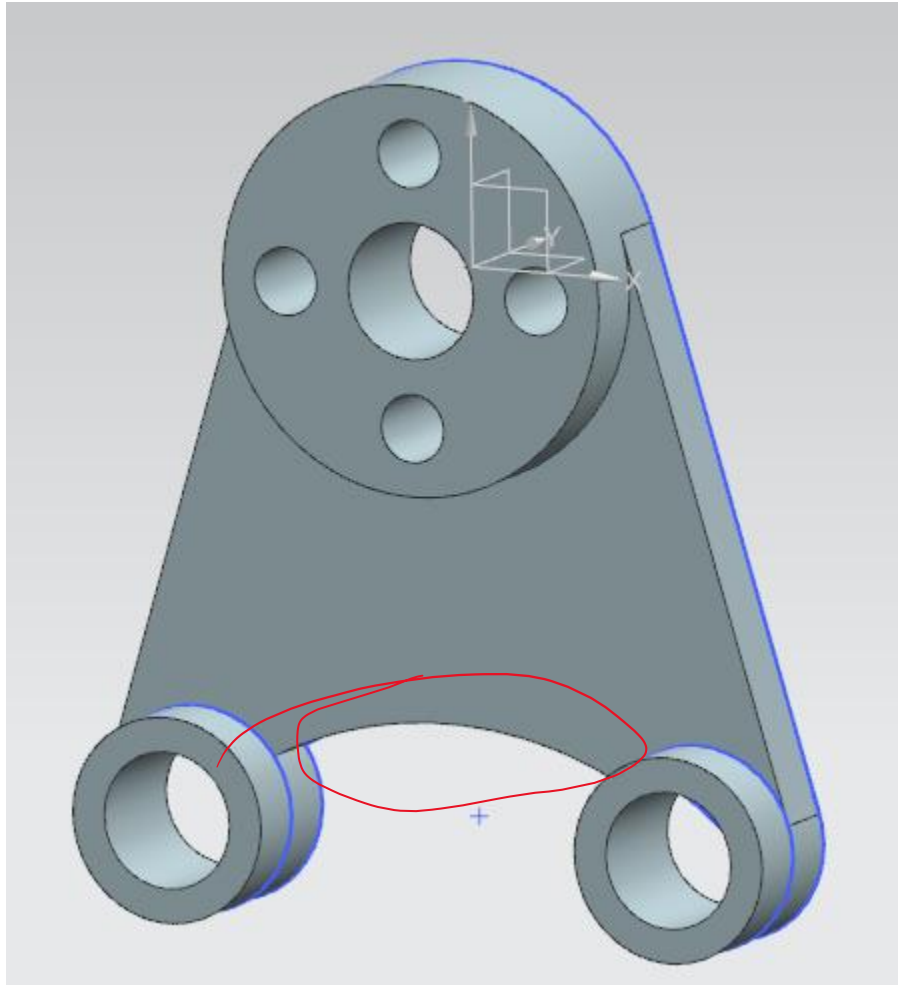


P3.

No submission

- 25

P4.



- 1

**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

HOMEWORK 1

TOPICS COVERED IN HOMEWORK 1

1. Primitives and Holes

MCEG1102: Mechanical Engineering Drawing I

Fall 2021

Homework #1

Assigned on 09/13/2021, Due on 09/20/2021

Name:

ID:

Note: You need to submit

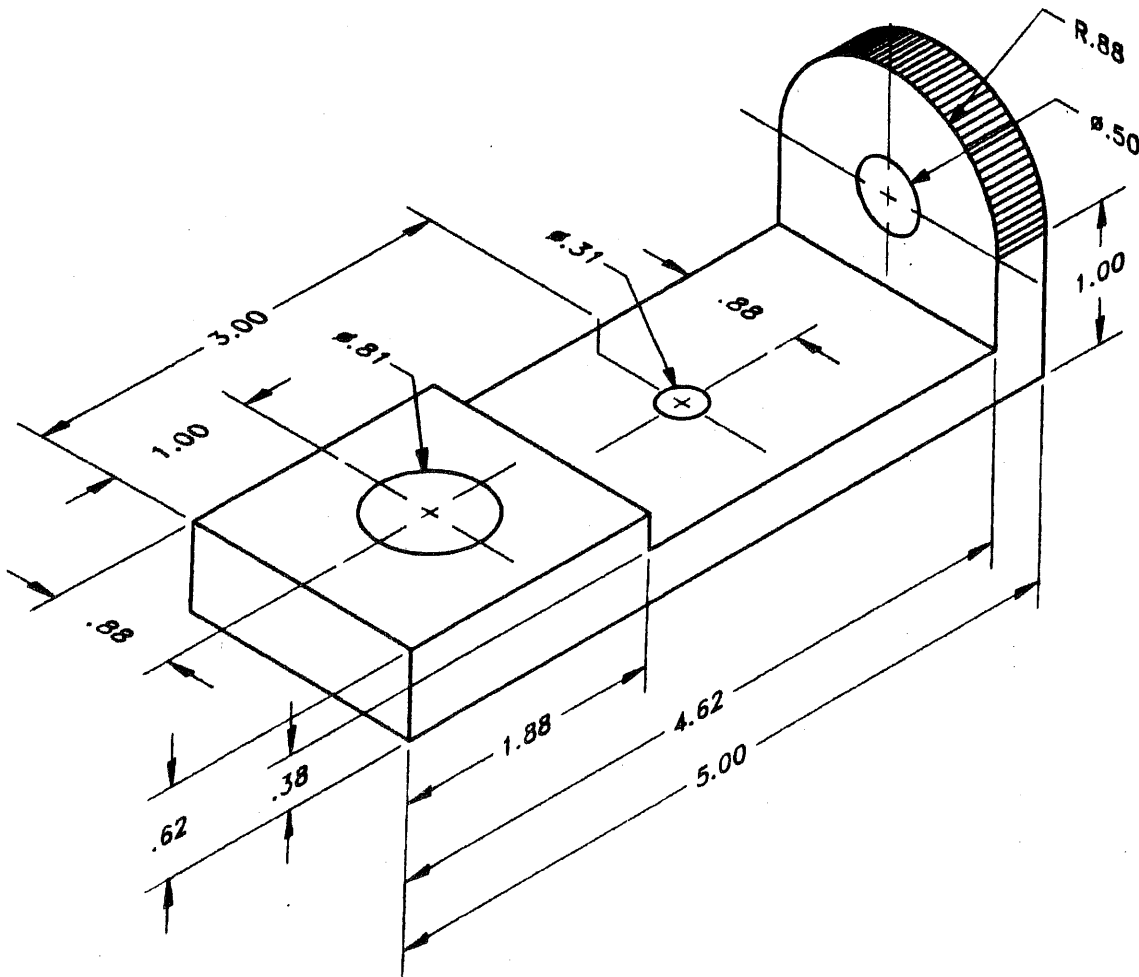
(a) One printout hardcopy

(b) The electronic files of NX problems on Ecourses.

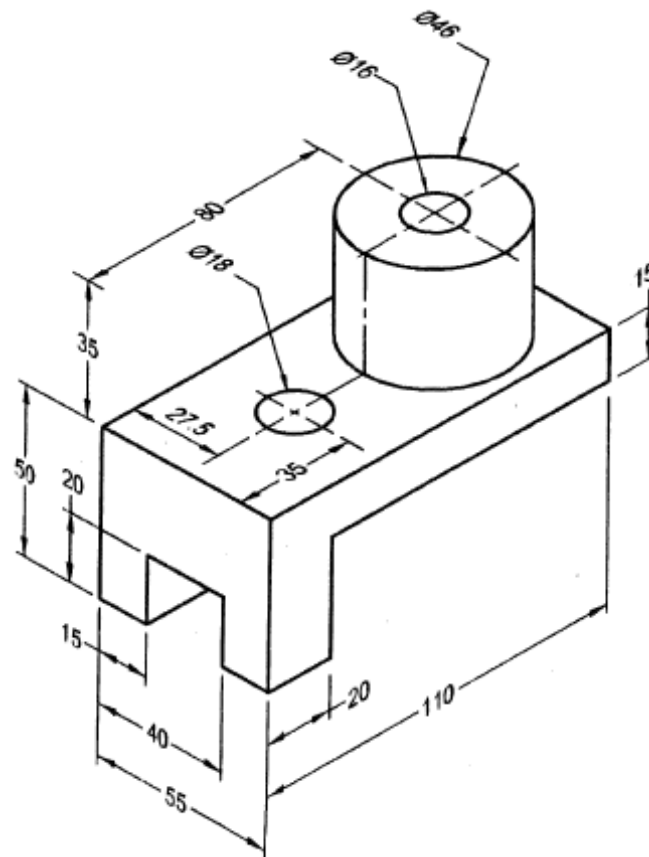
Name your file as "H" + "No. of homework" + "_" + "P" + "no. of the problem" + "_" + "your lastname". For example: H1_P1_Duan.prt

*** Your grade will be "0" if you miss either the hard copy or the electronic file.**

1. Create a model using NX10 as shown below (Units: inch).



2. Create a model using NX10 as shown below (Units: mm).



3. Create a model using NX10 as shown below (Units: inch).

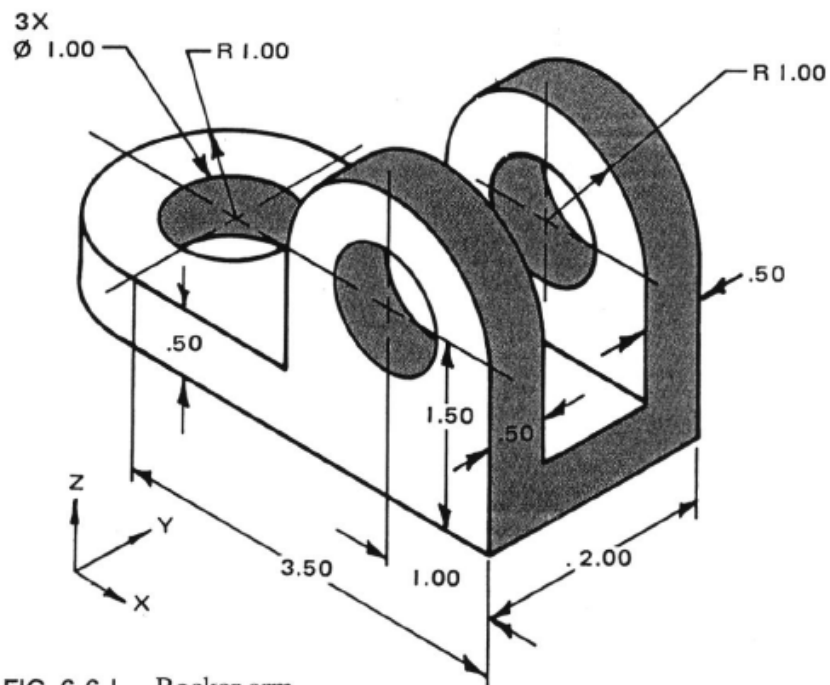
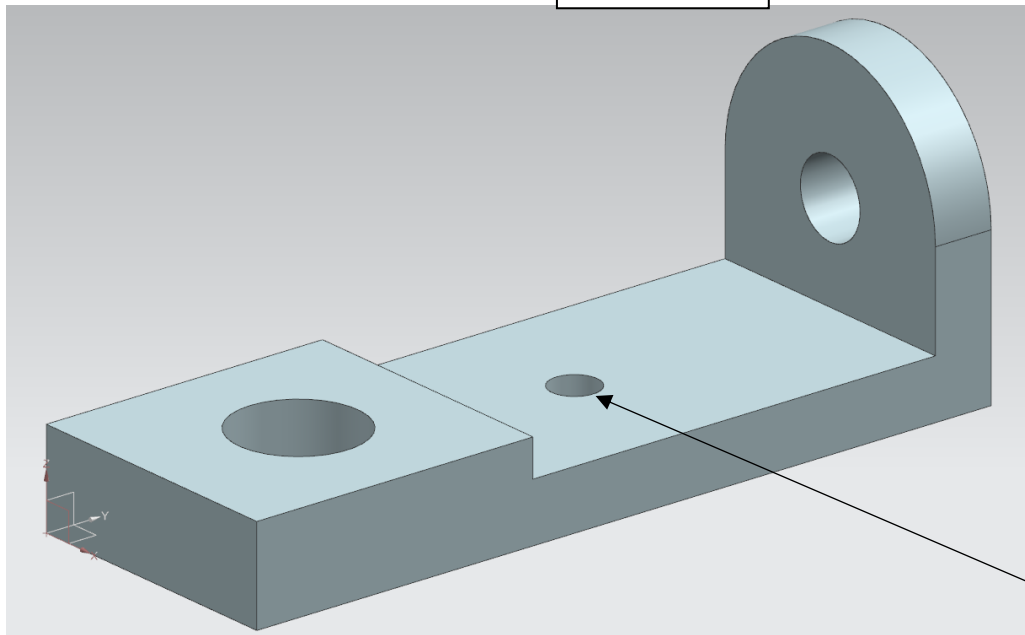


FIG. 6-6-L Rocker arm.

ABOVE AVERAGE

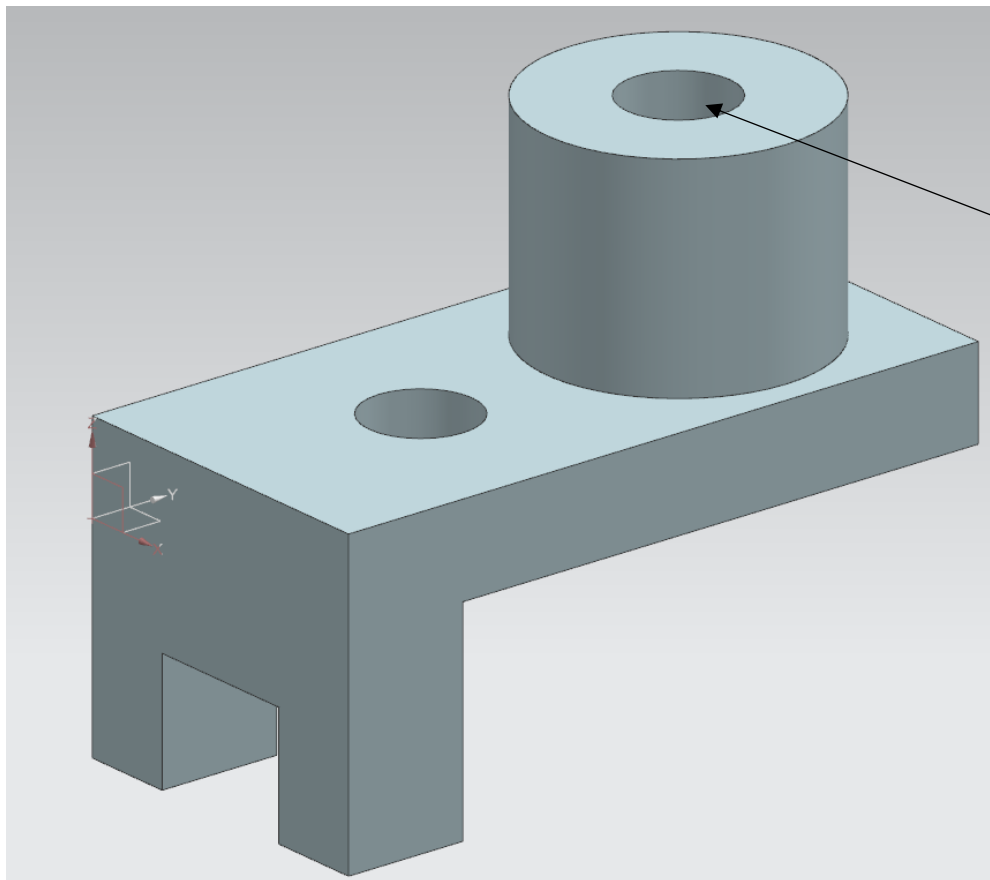
P1.

97



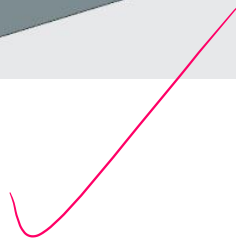
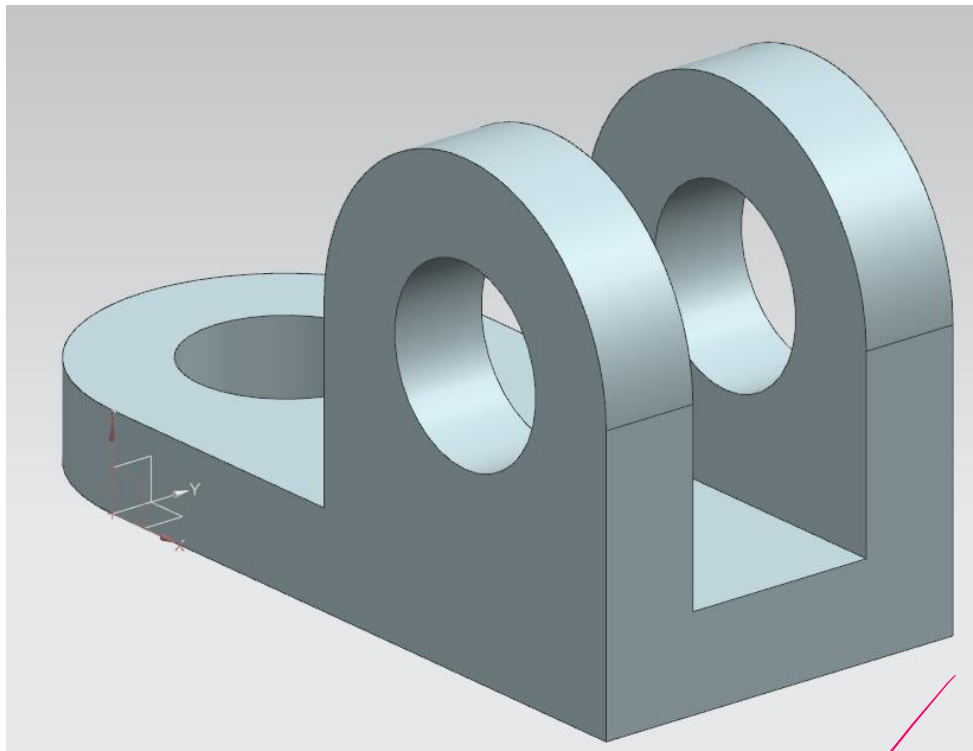
Position off -2

P2.



Dimension off -1

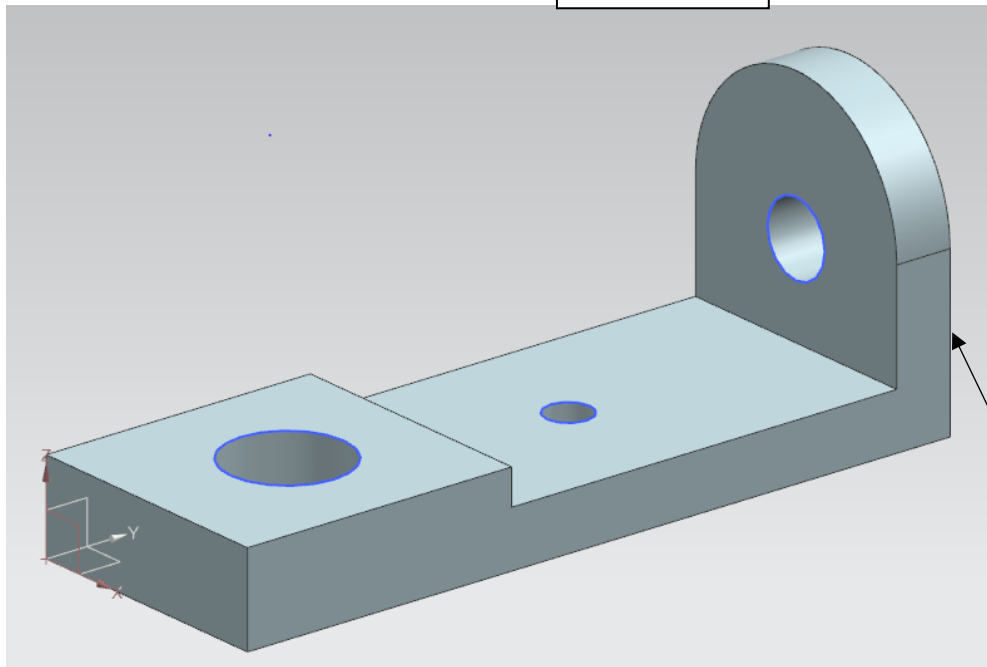
P3.



AVERAGE

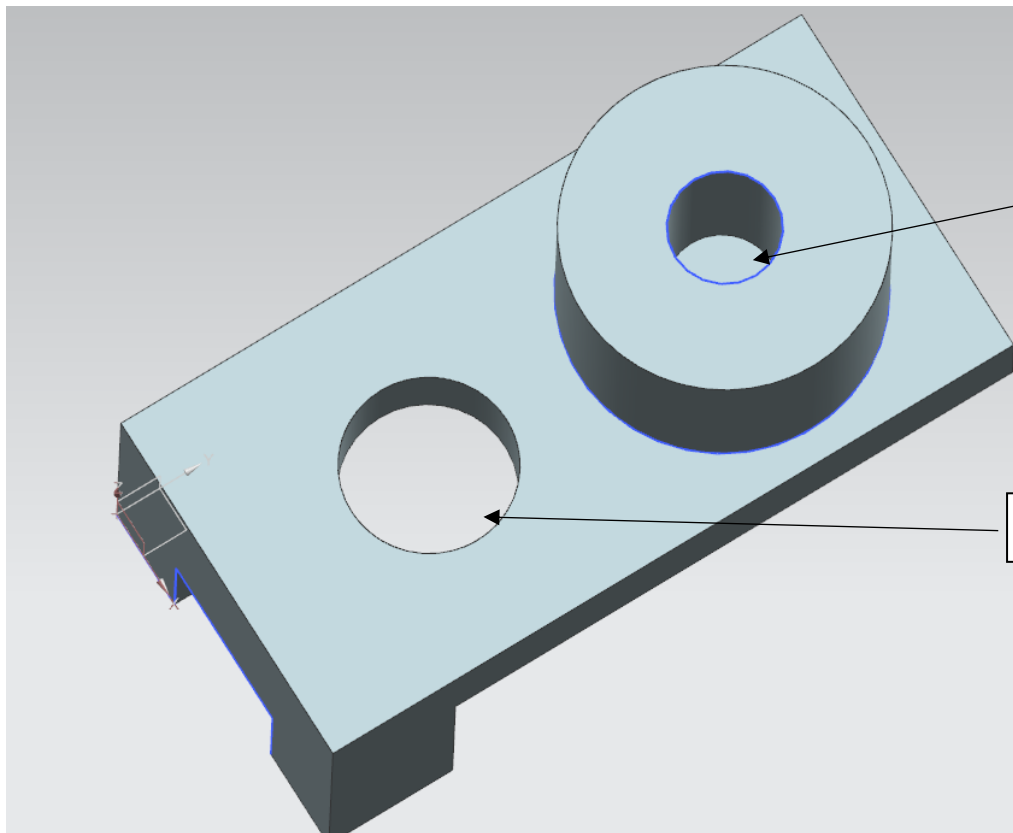
P1.

91



Height off -2

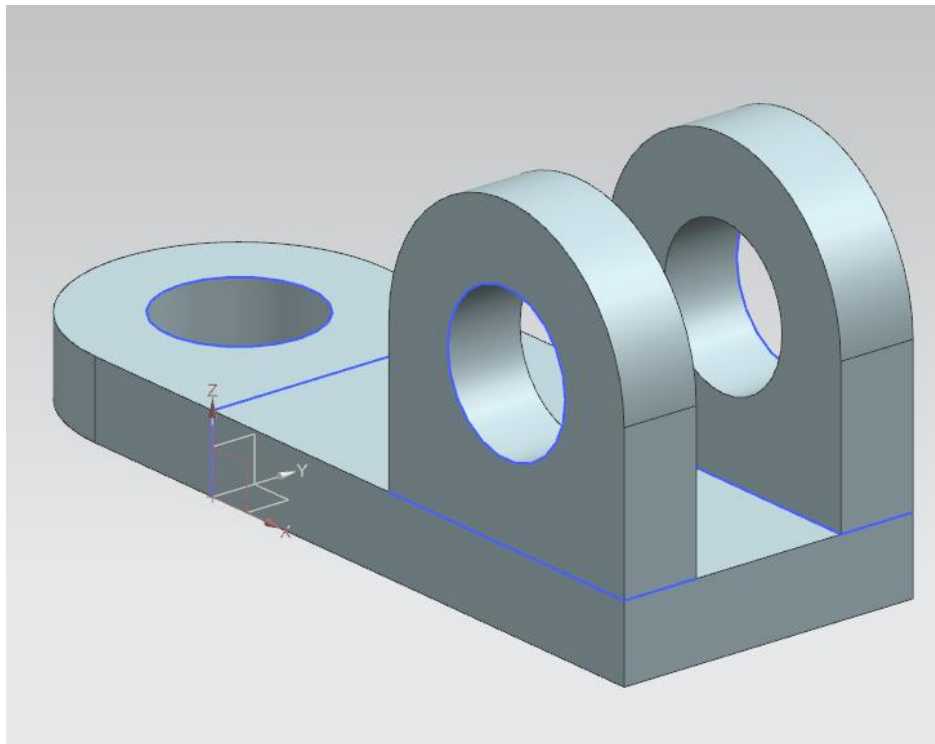
P2.



Hole not through -3

Hole dimension off -2

P3.

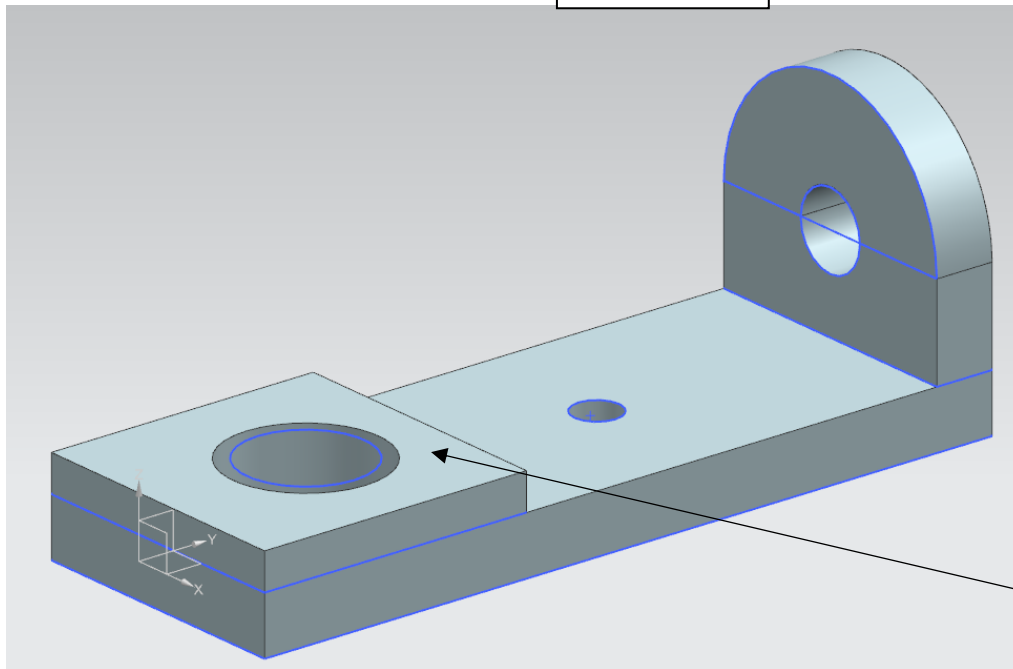


Length off -2

BELOW AVERAGE

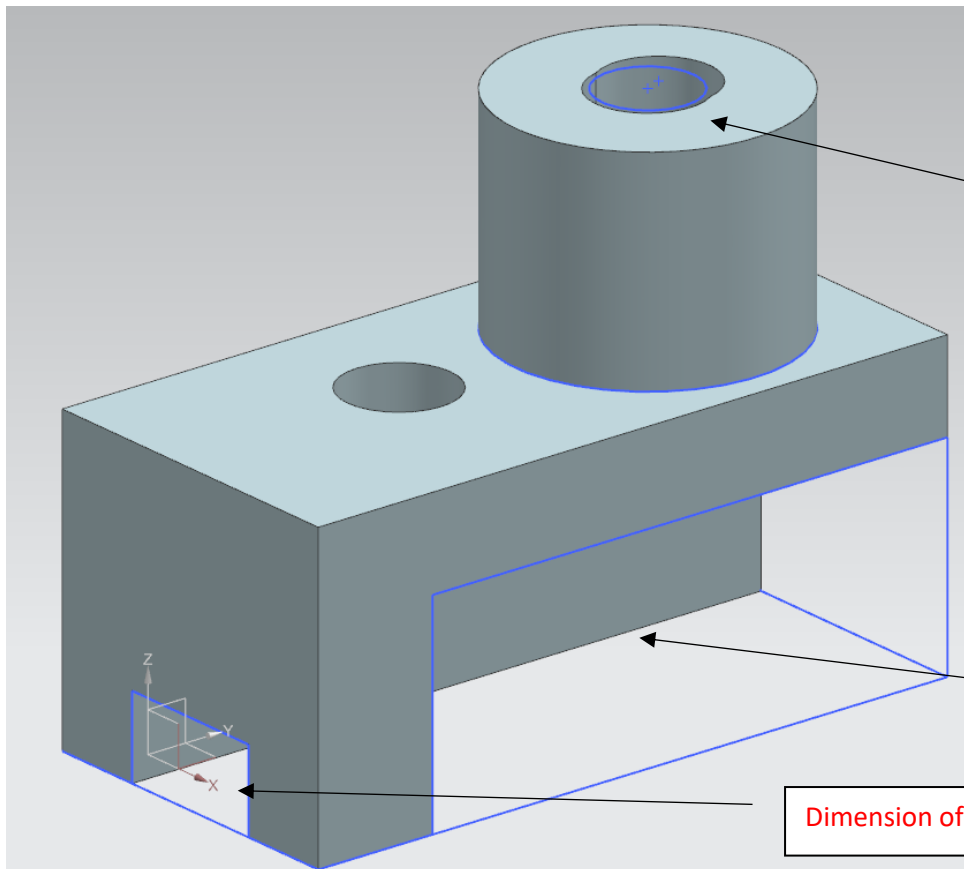
P1.

78



Length, width,
Hole dimension off -5

P2.

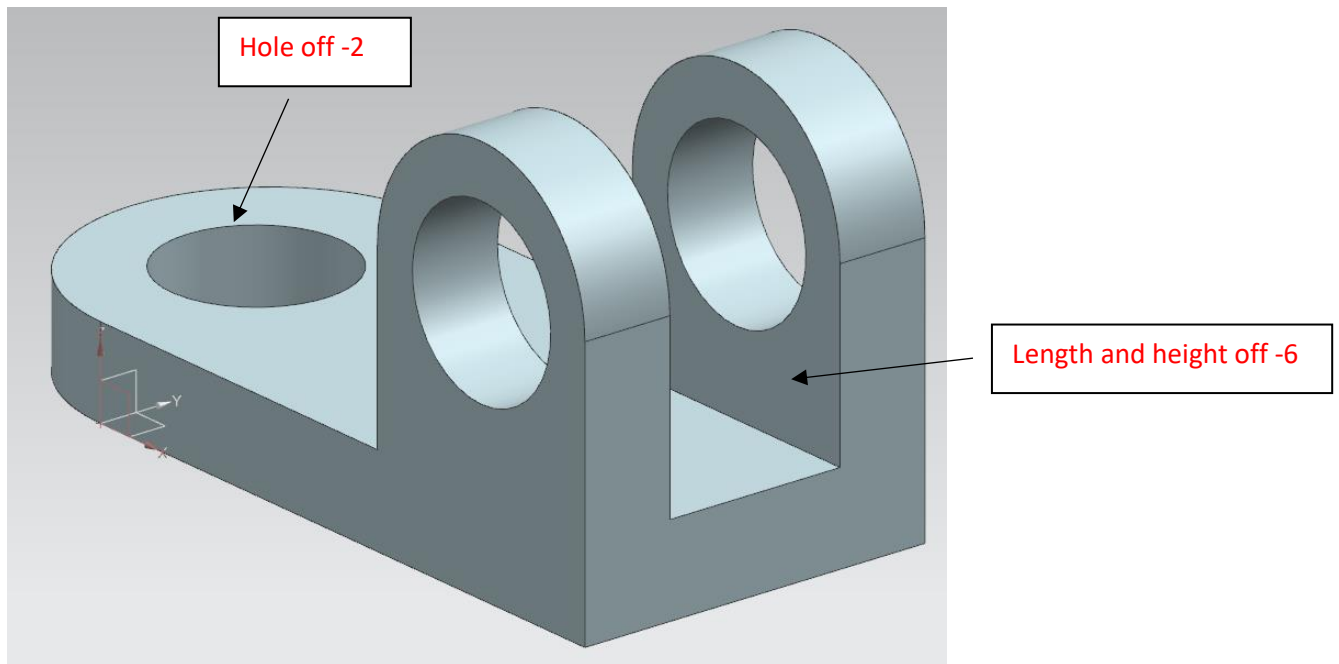


Location and
dimension off -4

Extra feature -3

Dimension off -2

P3.



**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

HOMEWORK 2

TOPICS COVERED IN HOMEWORK 2

1. Sketch and Modeling

MCEG1102 Mechanical Engineering Drawing I

Fall 2021 P04

Homework #2

Assigned on 09/20/21, Due on 09/27/21

Name:

ID:

Note: You need to submit

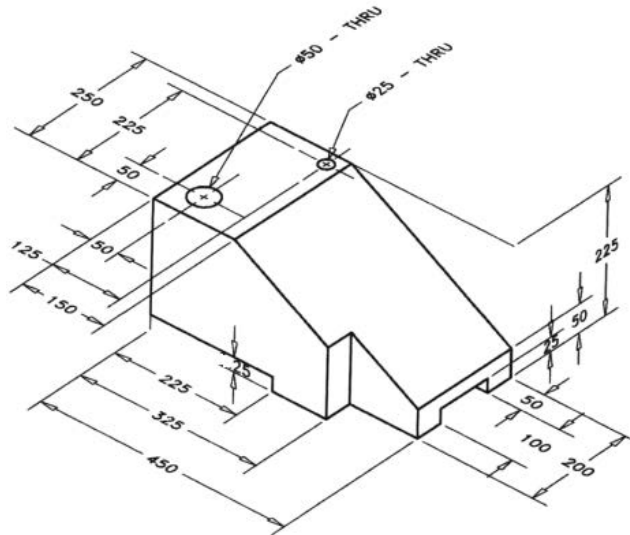
The electronic files of NX problems on Canvas.

Name your file as "H" + "No. of homework" + "_" + "P" + "no. of the problem" + "_" + "your lastname".

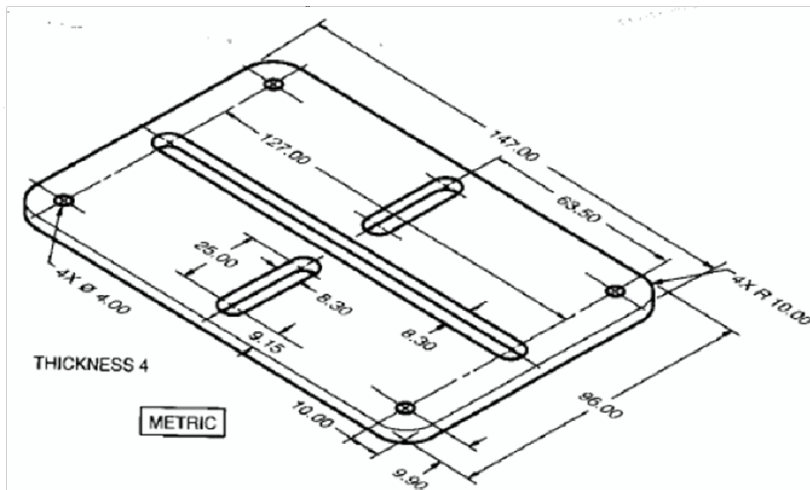
For example: H2_P1_Duan.prt

*** Your grade will be "0" if you miss the electronic file.**

1. Create a model using NX10 as shown below (unit mm).

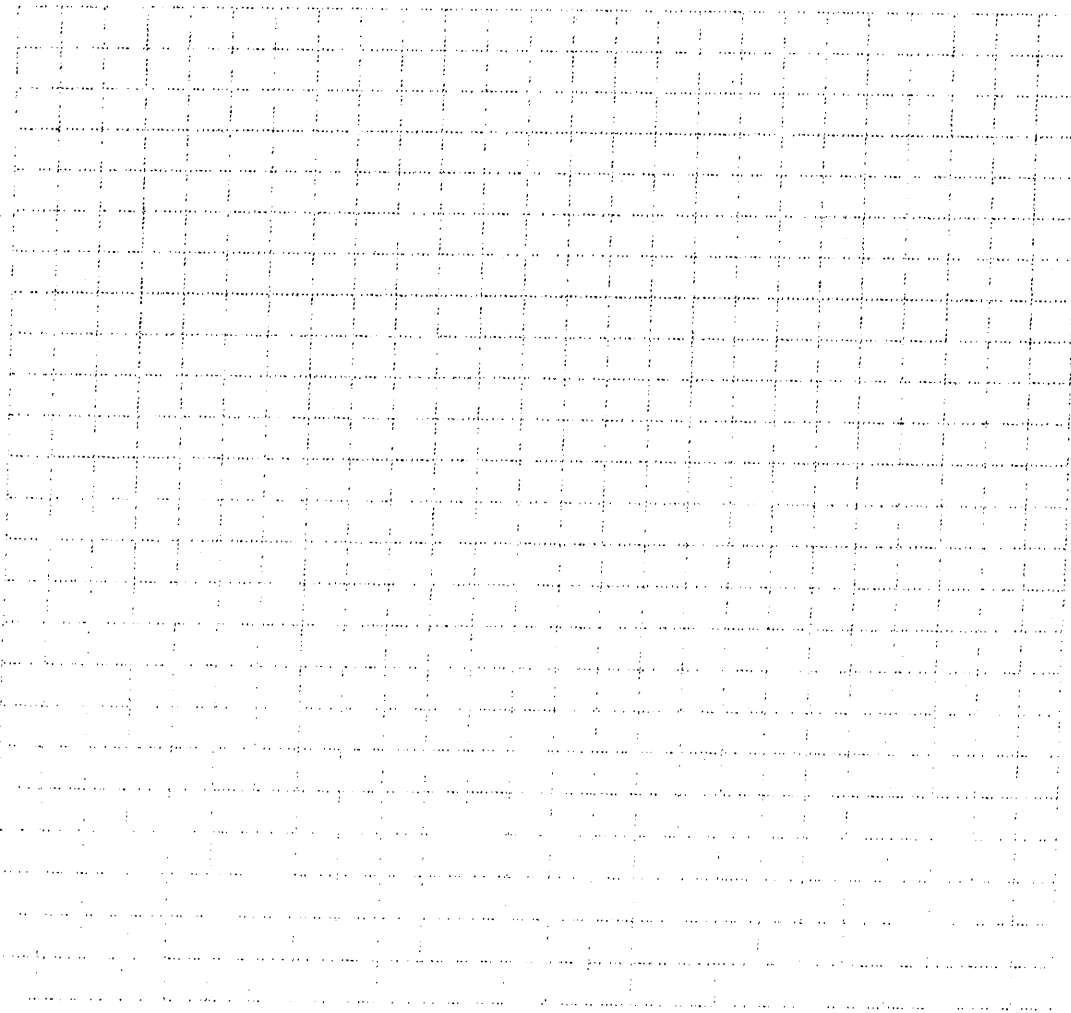
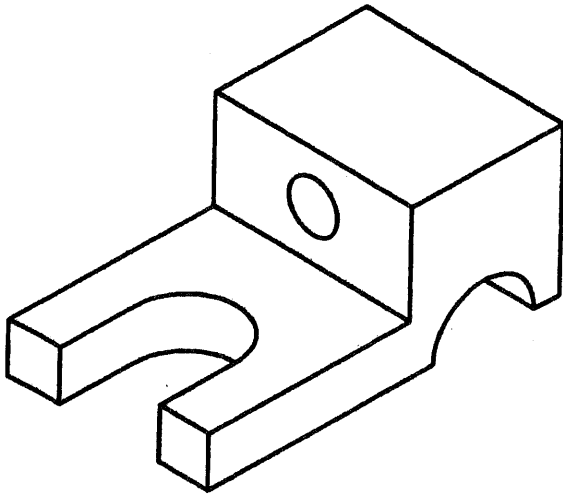


2. Create a solid model using NX10 as shown below (unit mm)



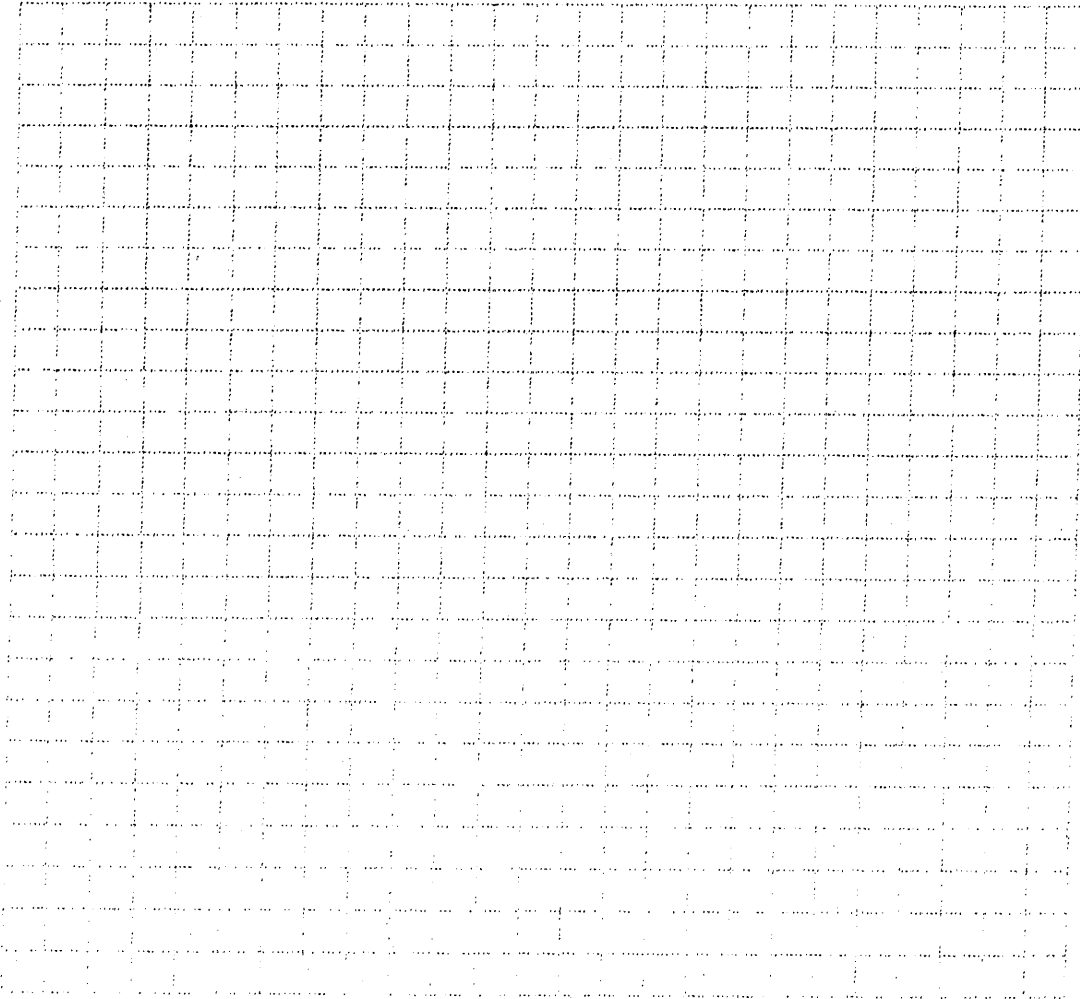
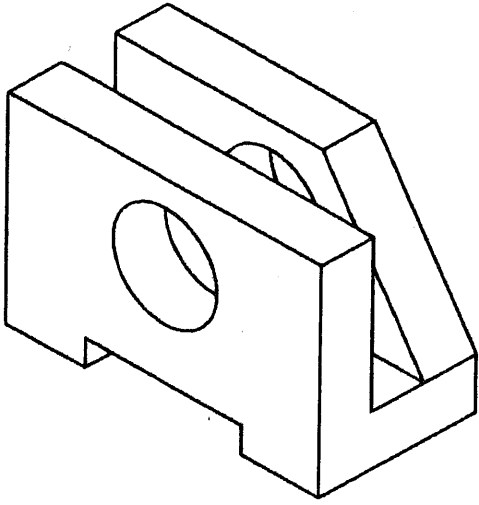
Name: _____ Date: _____

P1-11) Sketch the front, top and right side views of the following object. Use the grid provided.



Name: _____ Date: _____

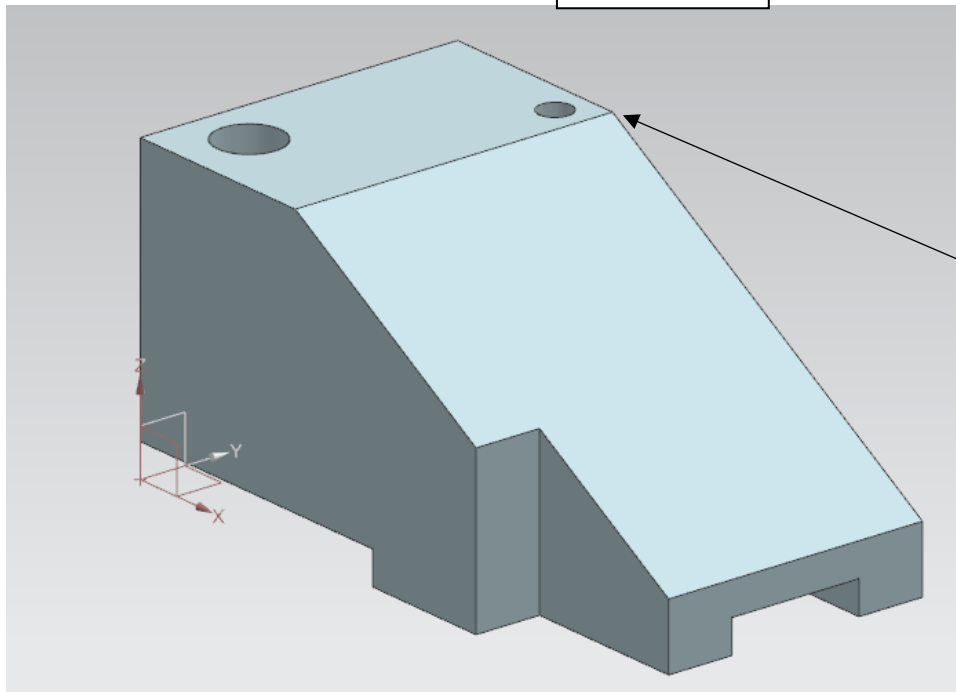
P1-15) Sketch the front, top and right side views of the following object. Use the grid provided.



ABOVE AVERAGE

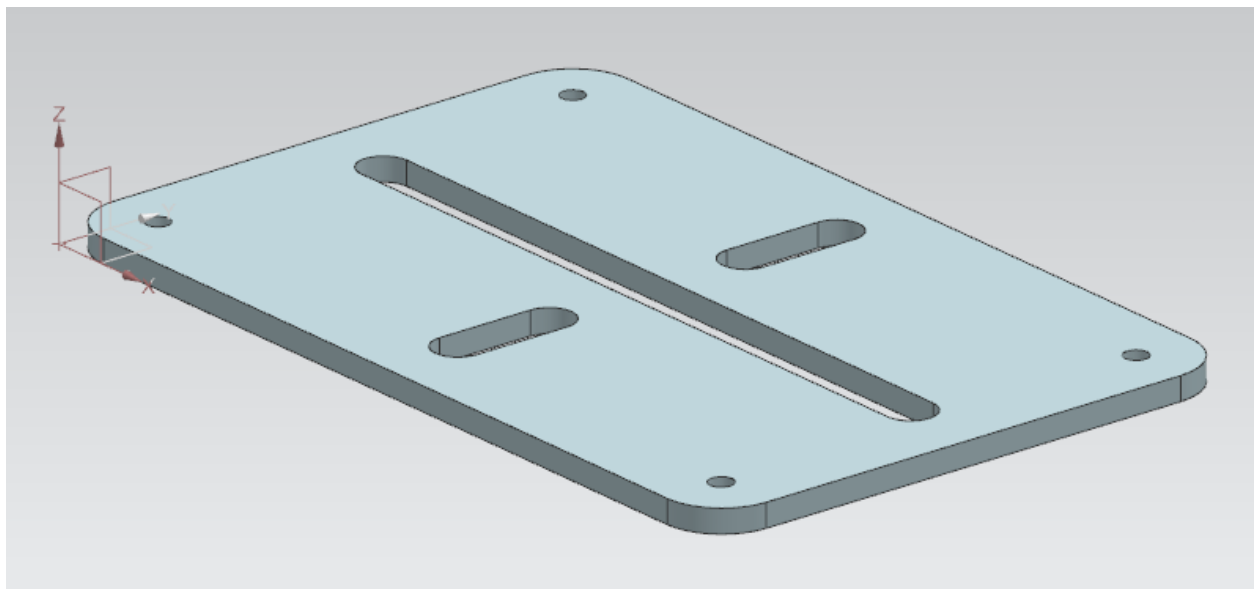
P1.

98

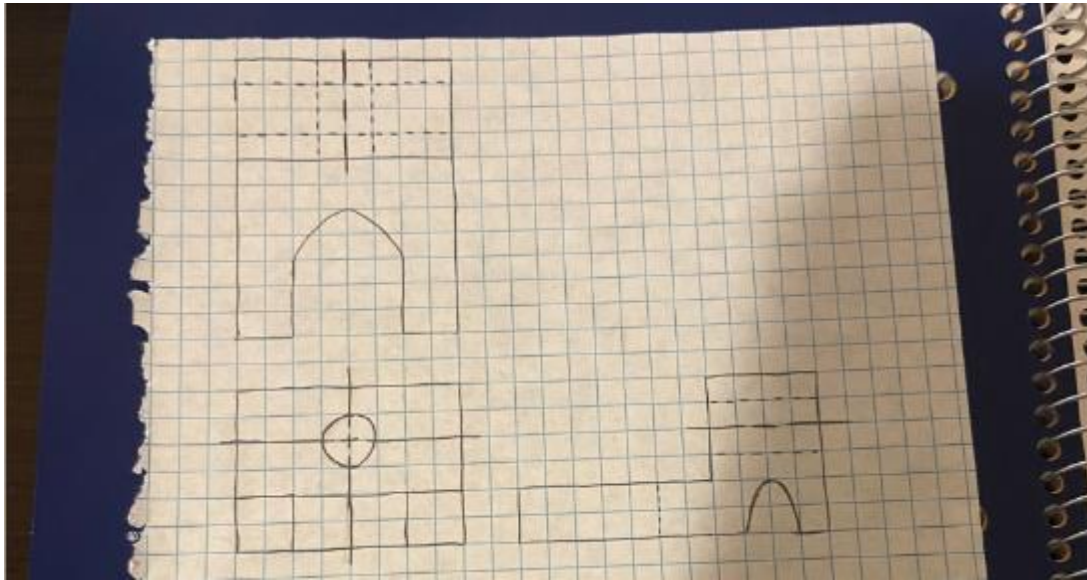


Hole off -1

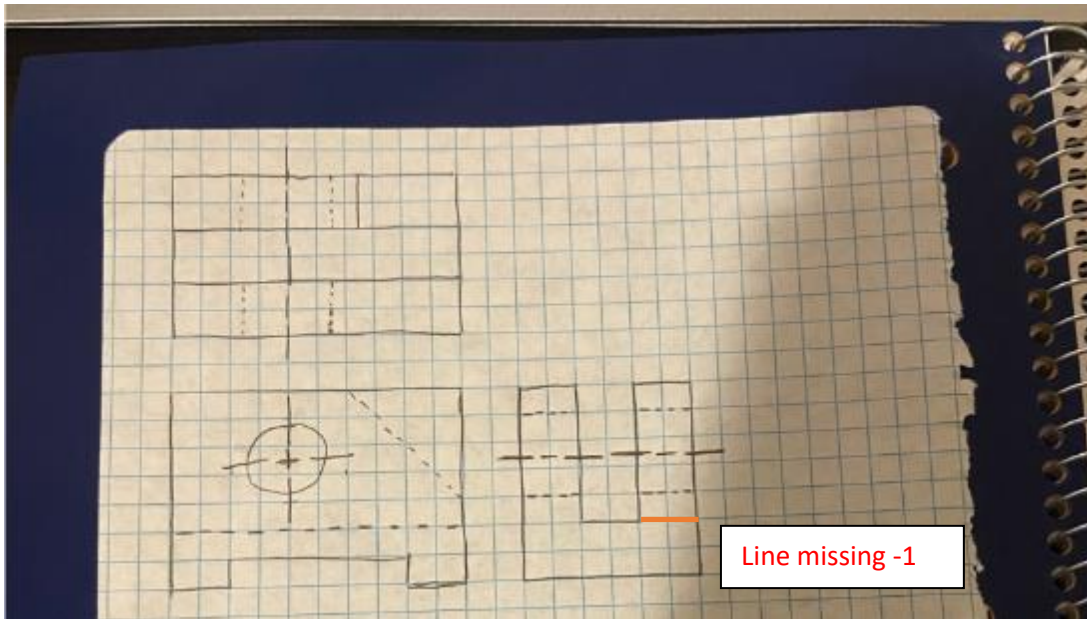
P2.



P3.



P4.

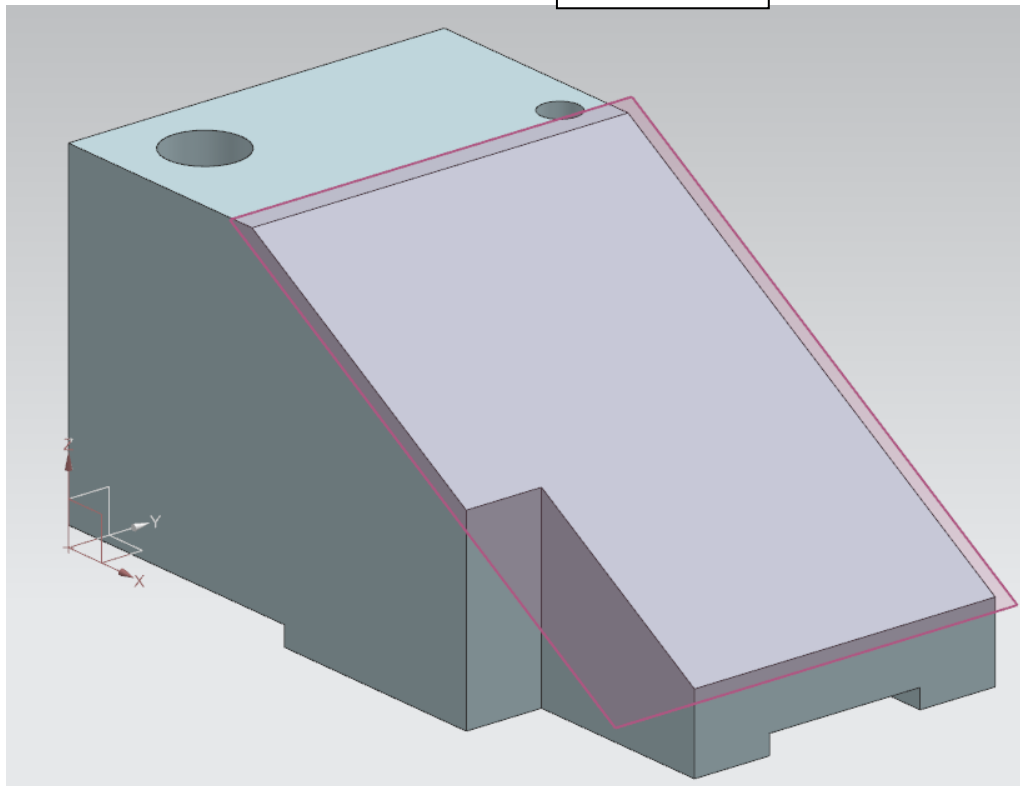


Line missing -1

AVERAGE

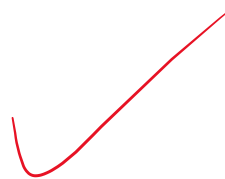
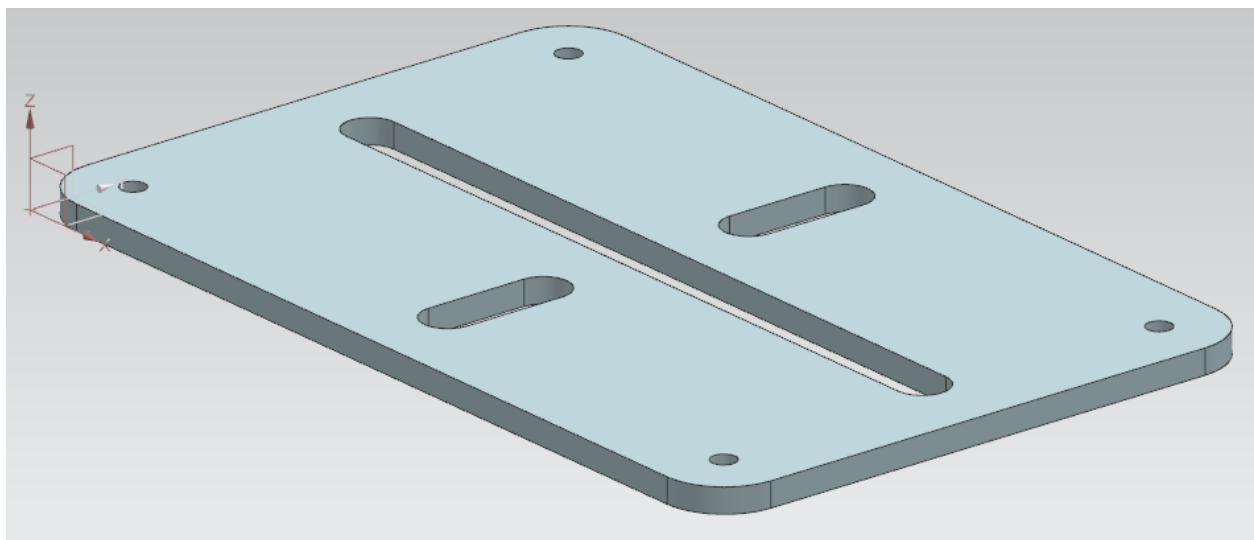
P1.

87

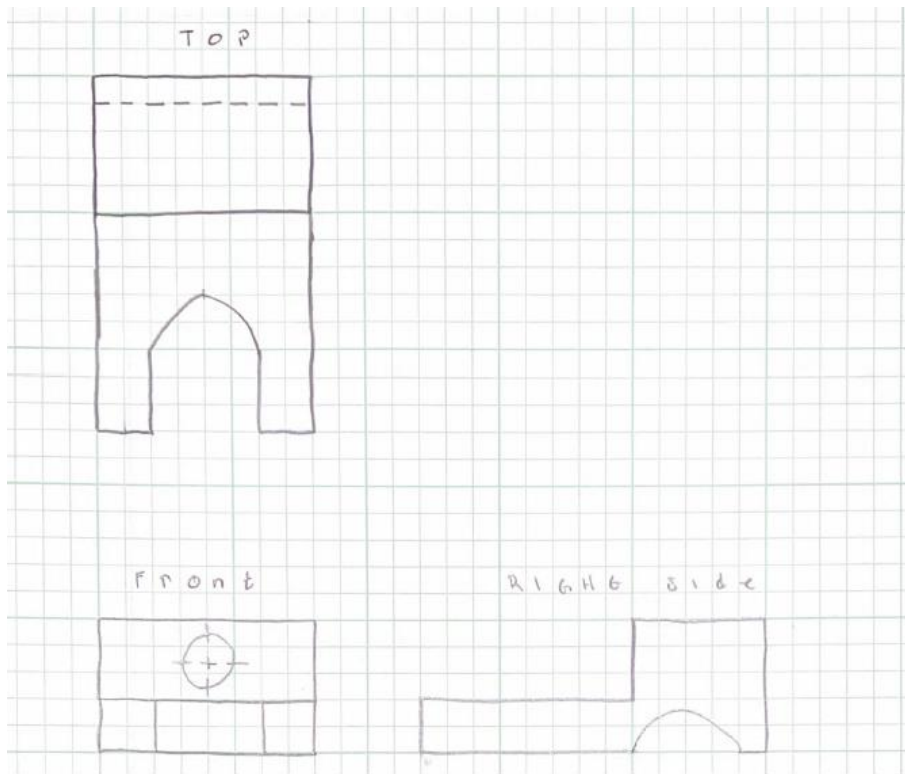


Pockets are off -5

P2.

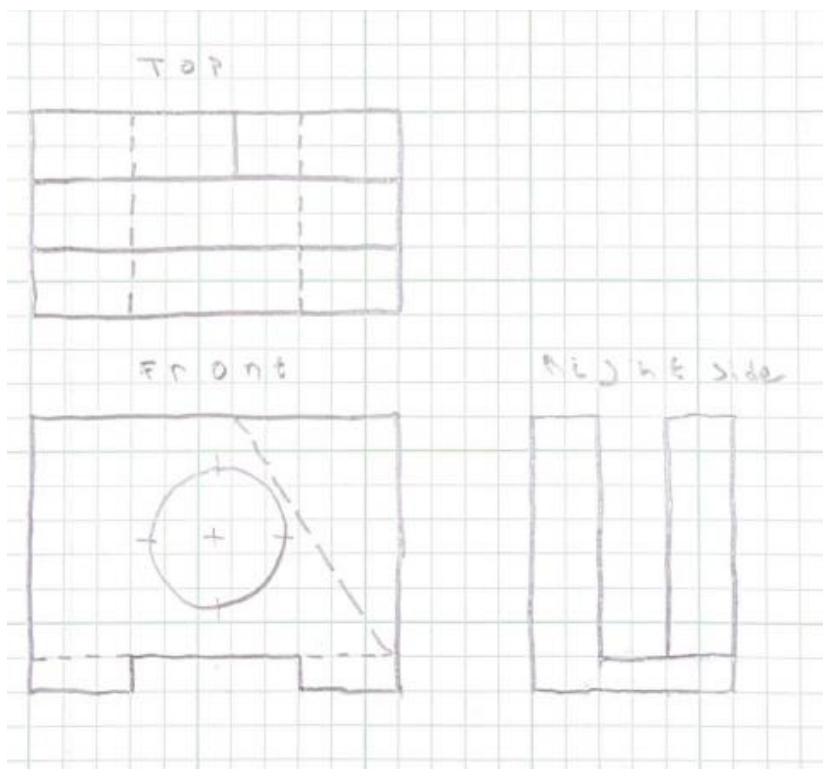


P3.



Missing some
hidden lines and
center lines -4

P4.

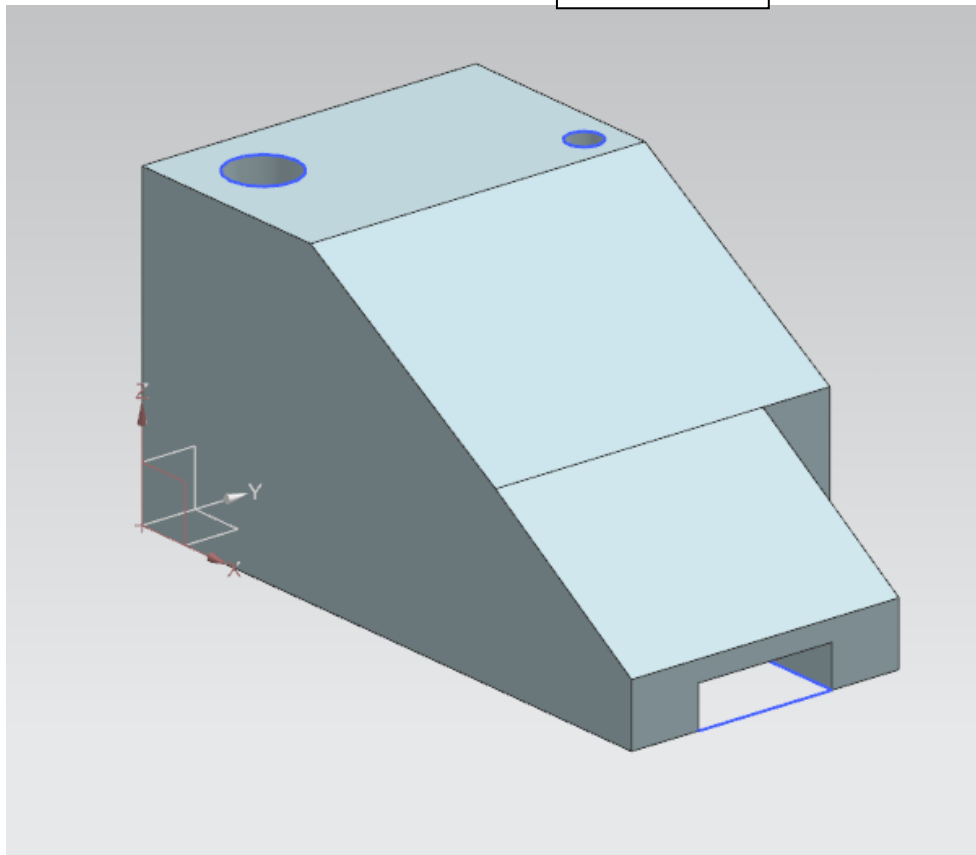


Missing some
hidden lines and
center lines -4

BELOW AVERAGE

P1.

75

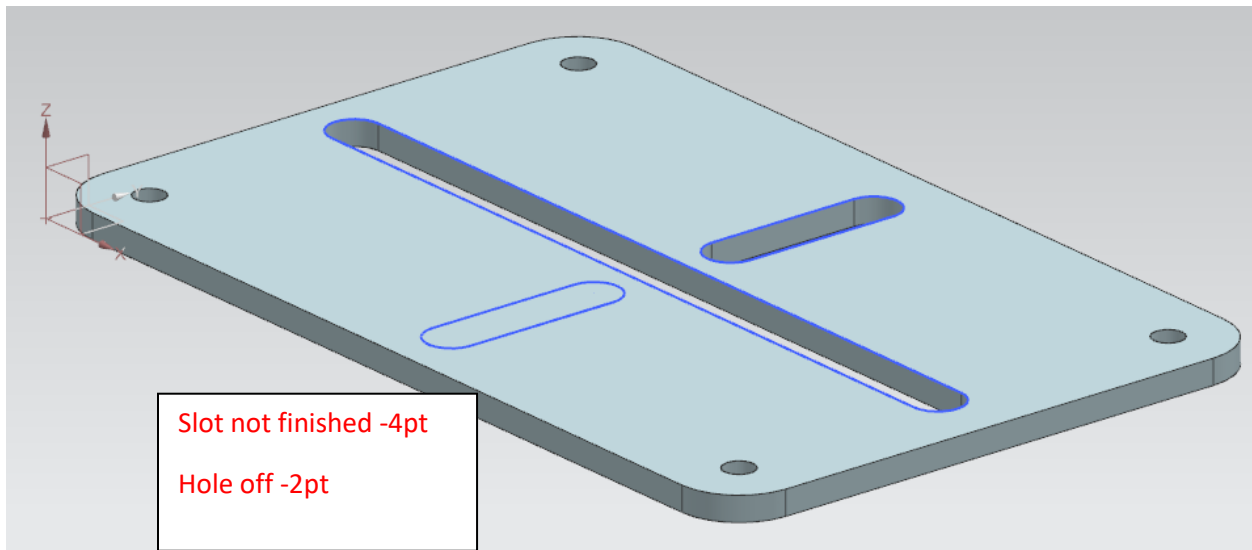


Feature is flipped -5pt

Missing Pocket -4pt

Hole -1pt

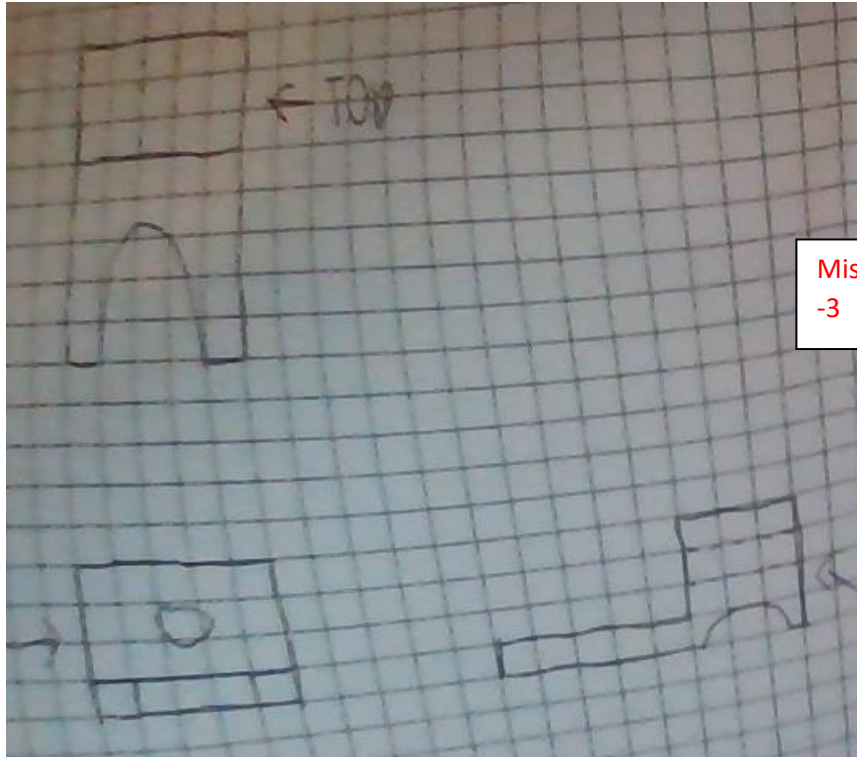
P2.



Slot not finished -4pt

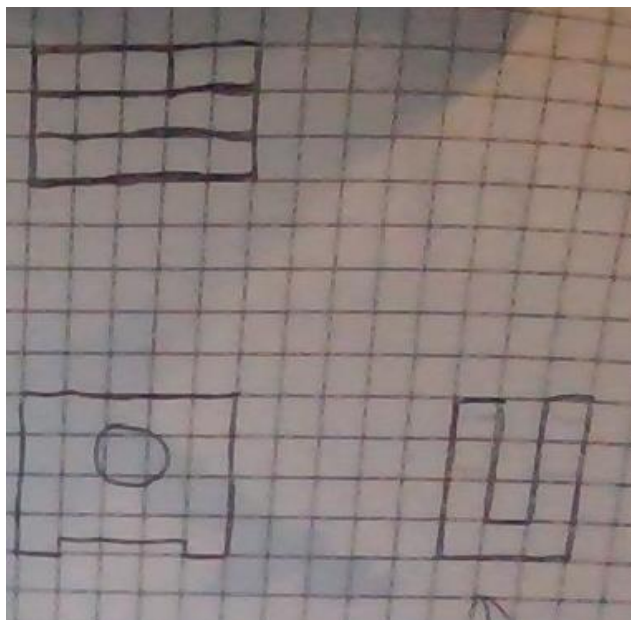
Hole off -2pt

P3.



Missing center lines
-3

P4.



Missing some visible
and center lines -6

**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

HOMEWORK 3

TOPICS COVERED IN HOMEWORK 3

1. Solid Modeling

MCEG1102: Mechanical Engineering Drawing I

Fall 2021 P04

Homework #3

Assigned on 09/27/21, Due on 10/04/21

Name:

Note: You need to submit (* Your grade will be "0" if you miss either the hard copy or the electronic files)

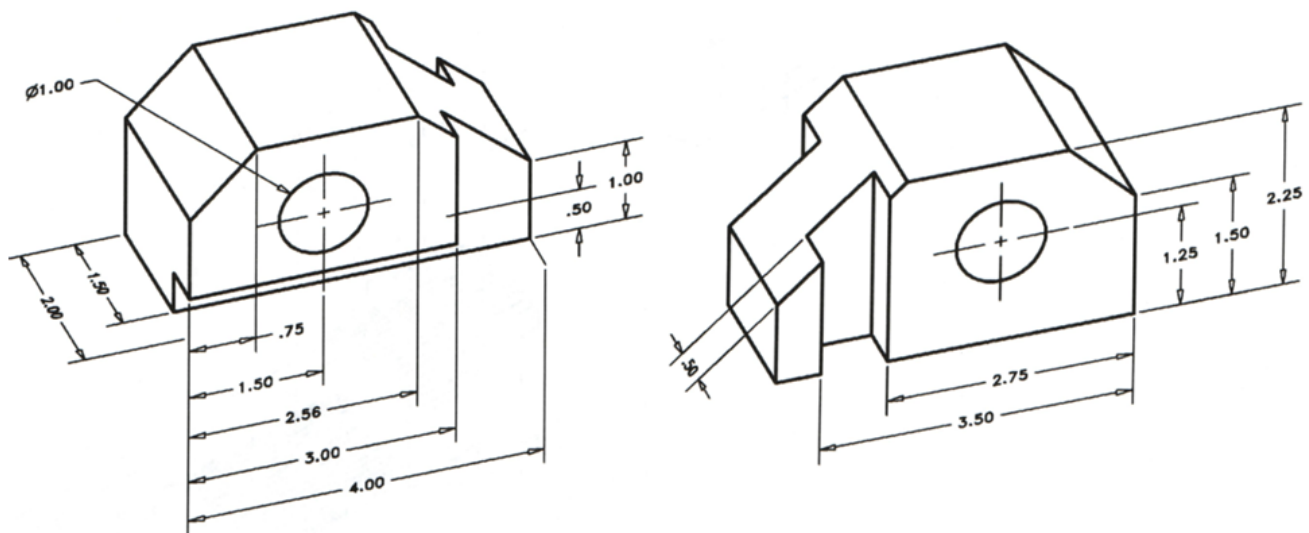
(a) One printout hardcopy

(b) The electronic files of NX problems on Ecourses.

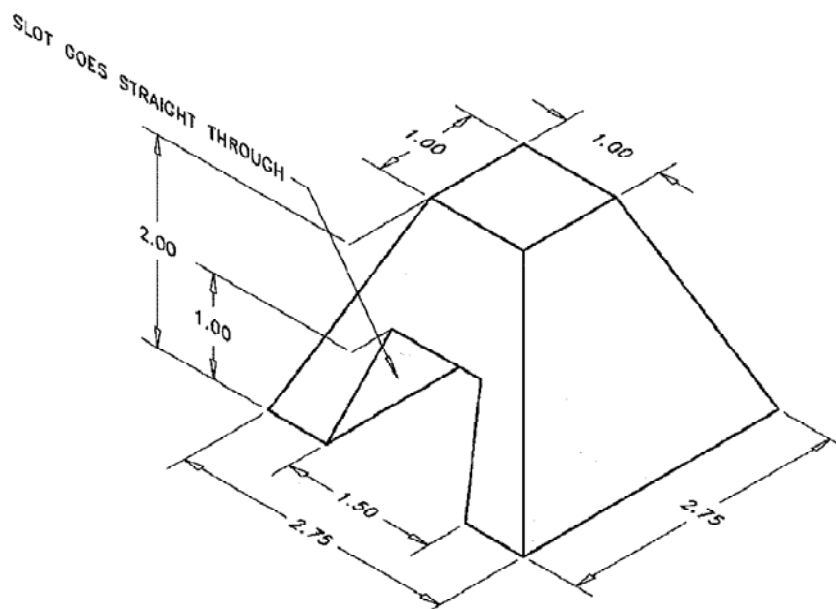
Name your file as "H" + "No. of homework" + "_" + "P" + "no. of the problem" + "_" + "your lastname".

For example: H1_P1_Peng.prt

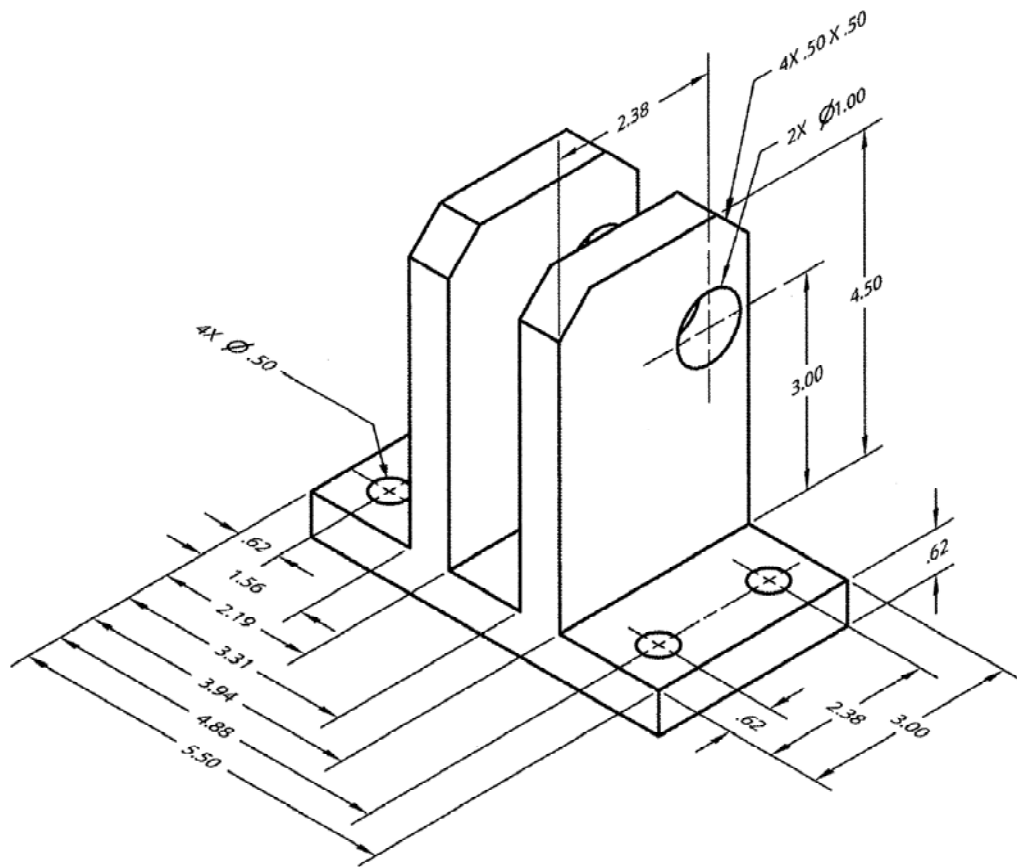
1. Create a solid model using NX as shown below (Unit inches).



2. Create a solid model using NX as shown below (Unit inches).



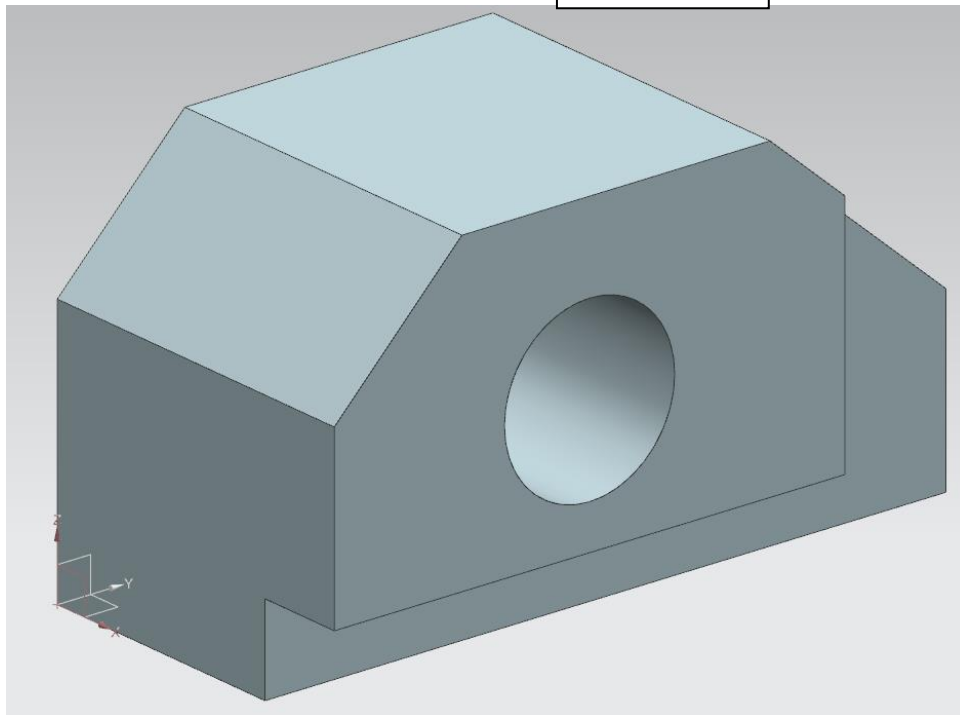
3. Create a solid model using NX as shown below (Unit inches).



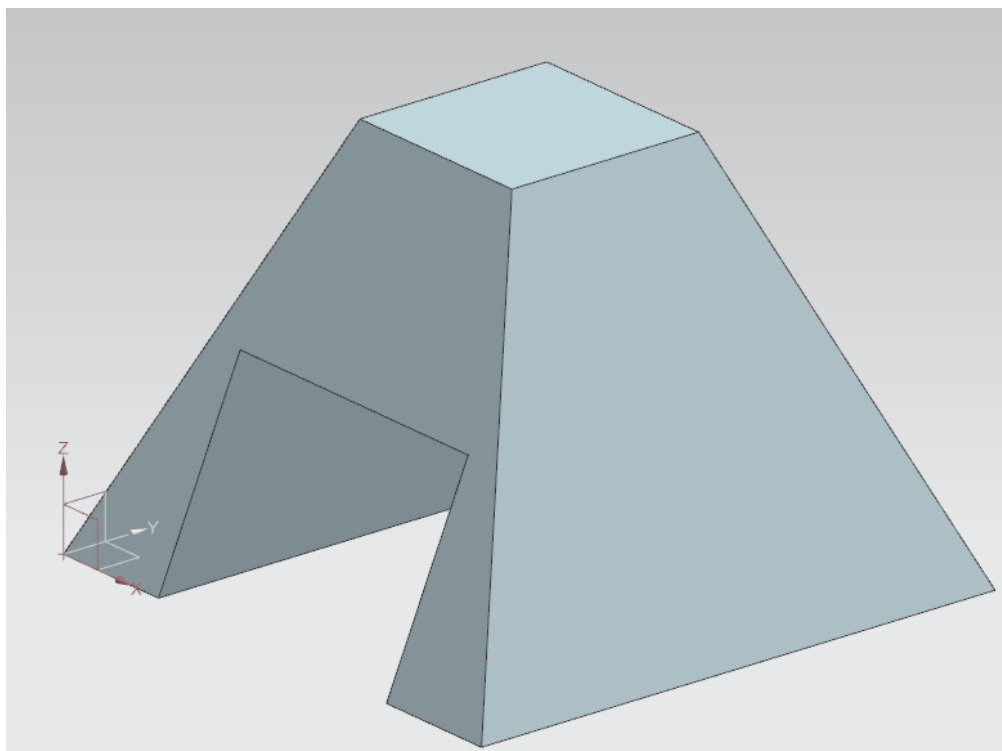
ABOVE AVERAGE

P1.

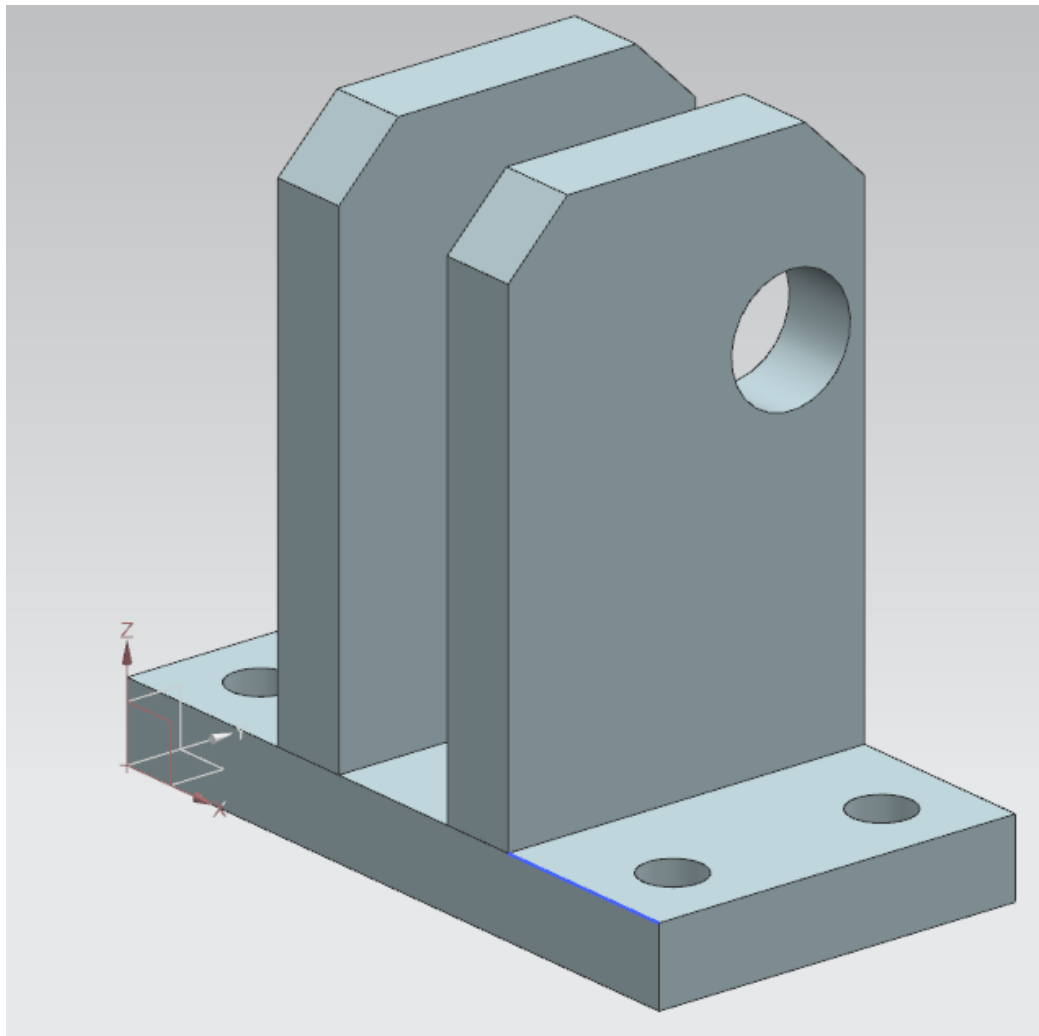
100



P2.



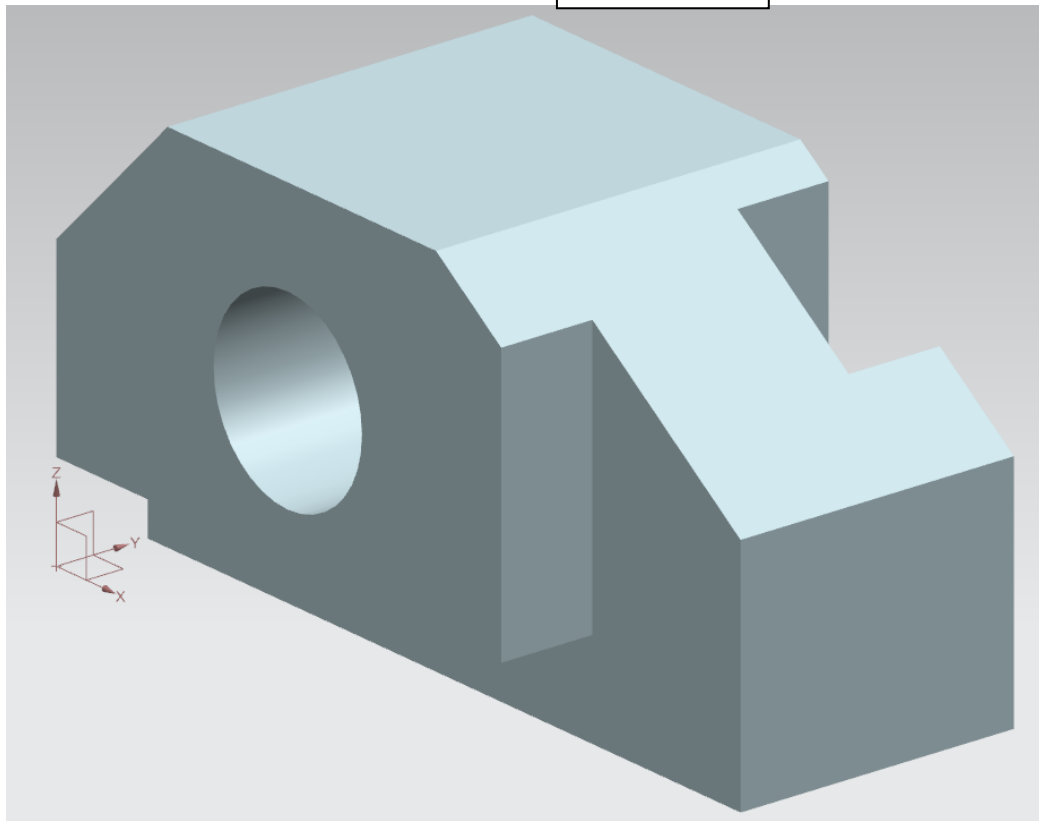
P3.



AVERAGE

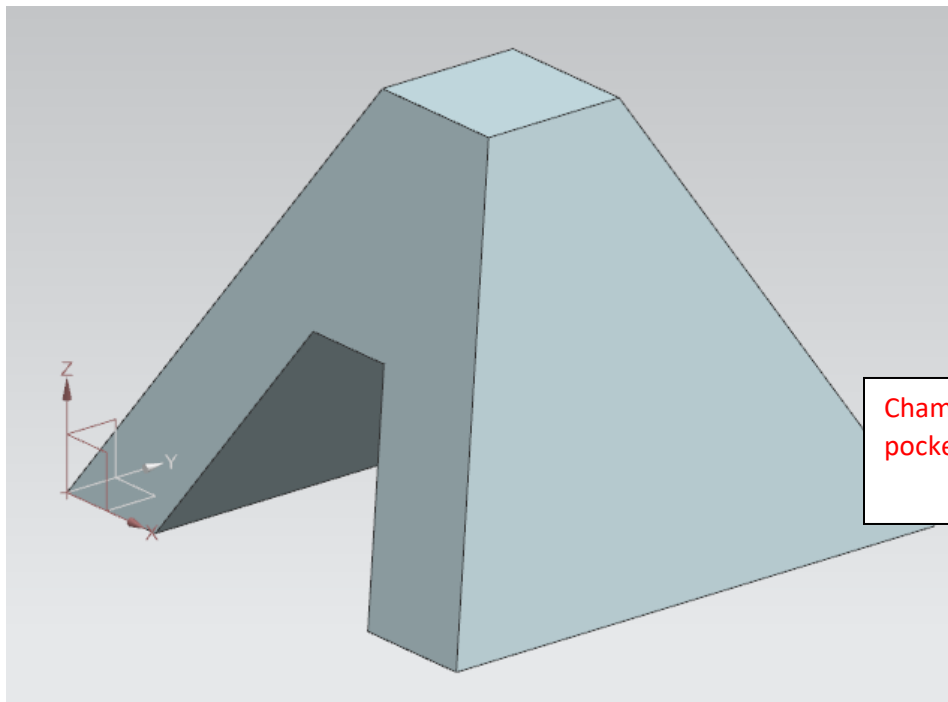
P1.

90



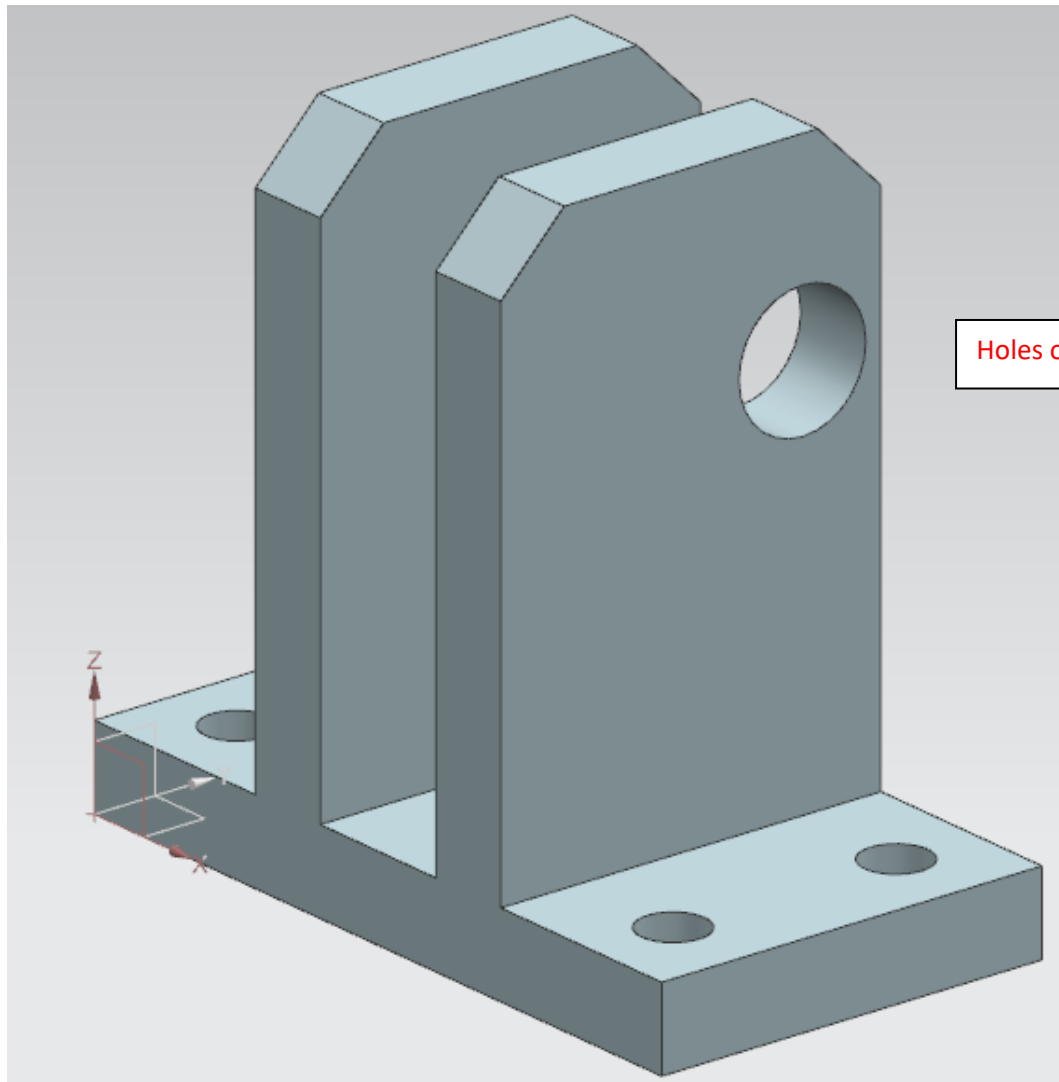
Chamfer off
Hole off
-2

P2.



Chamfers and
pocket off -6

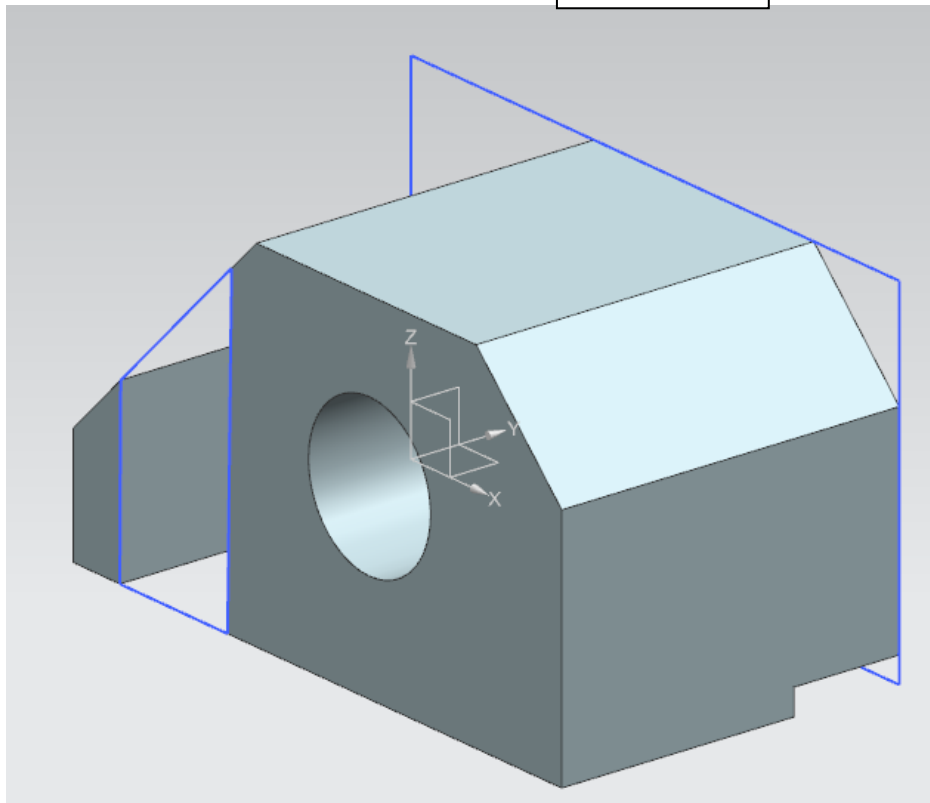
P3.



BELOW AVERAGE

P1.

80

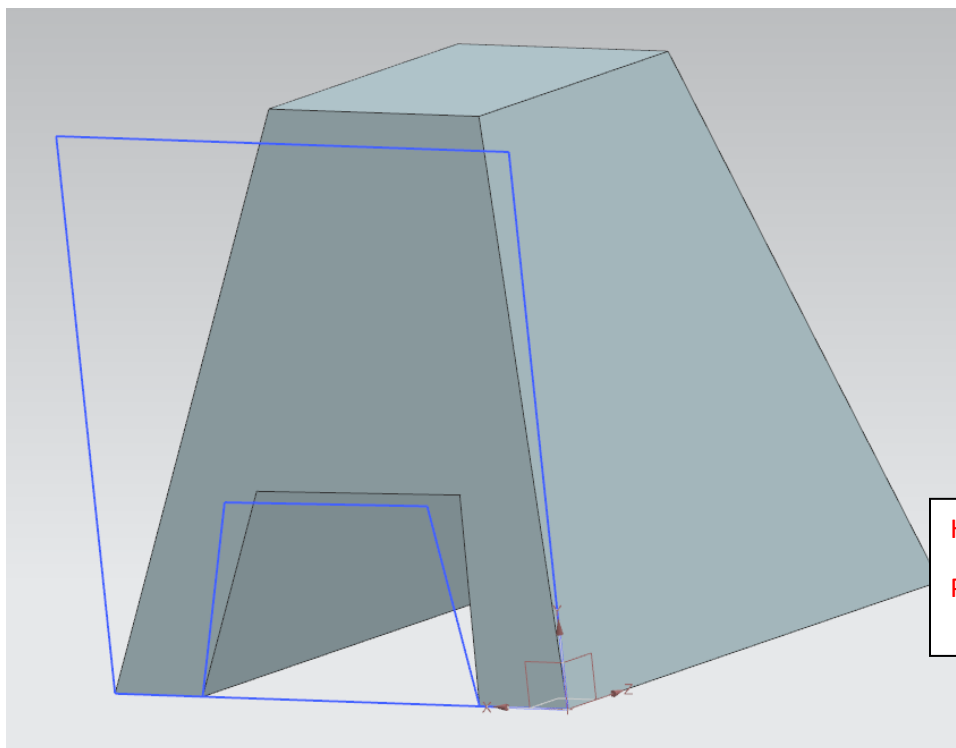


Chamfer-2pt

Pocket -2pt

Width -2pt

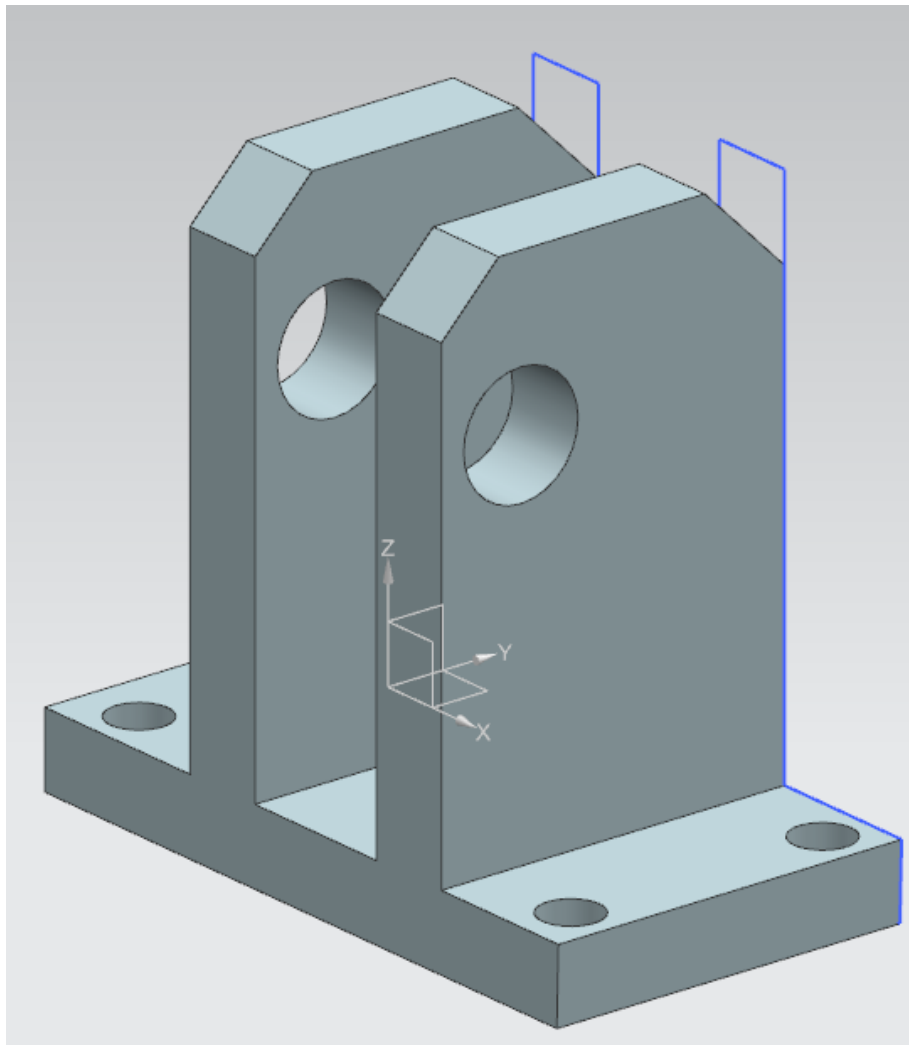
P2.



Height -4pt

Pocket -2pt

P3.



Holes -4pt

Top features -4pt

**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

HOMEWORK 4

TOPICS COVERED IN HOMEWORK 4

1. Solid Modeling

MCEG 1102 : Mechanical Engineering Drawing I

Fall 2021 - P04

Homework #4

Assigned on 10/04/21, Due on 10/11/21

Name:

ID:

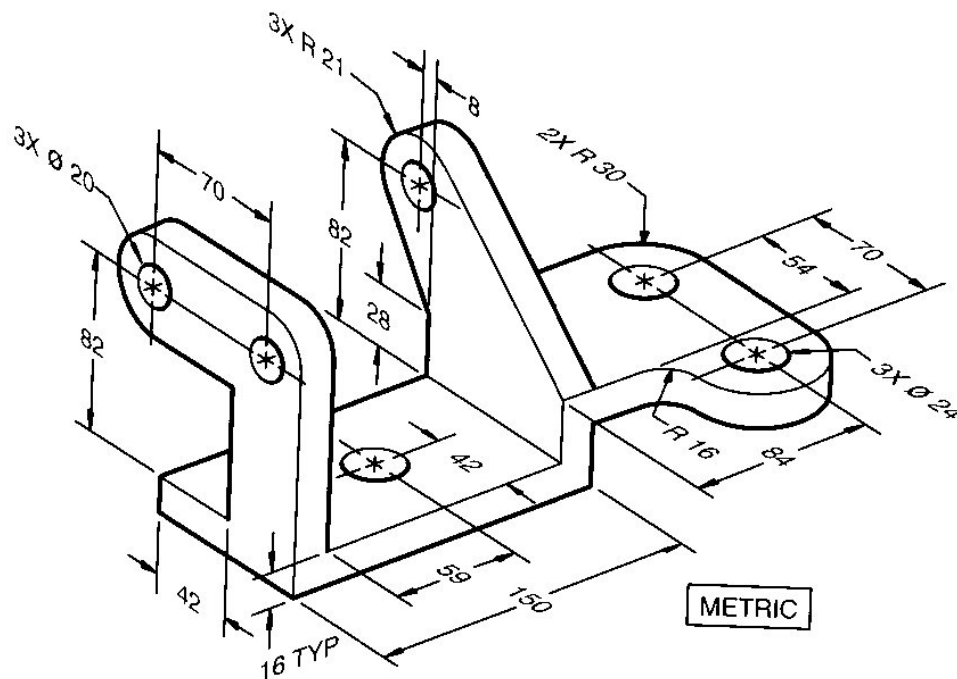
Note: You need to submit

The electronic files of NX problems on Ecourses.

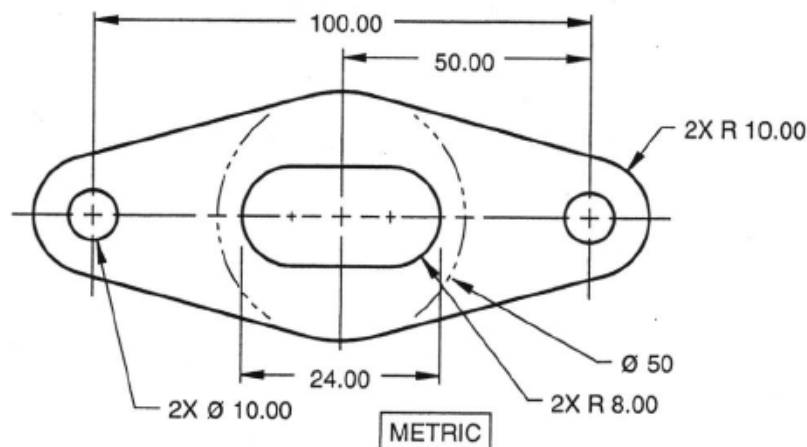
Name your file as "H" + "No. of homework" + "_" + "P" + "no. of the problem" + "_" + "your lastname".

For example: H1_P1_Duan.prt

1. Create a model using NX10 as shown below (unit mm).



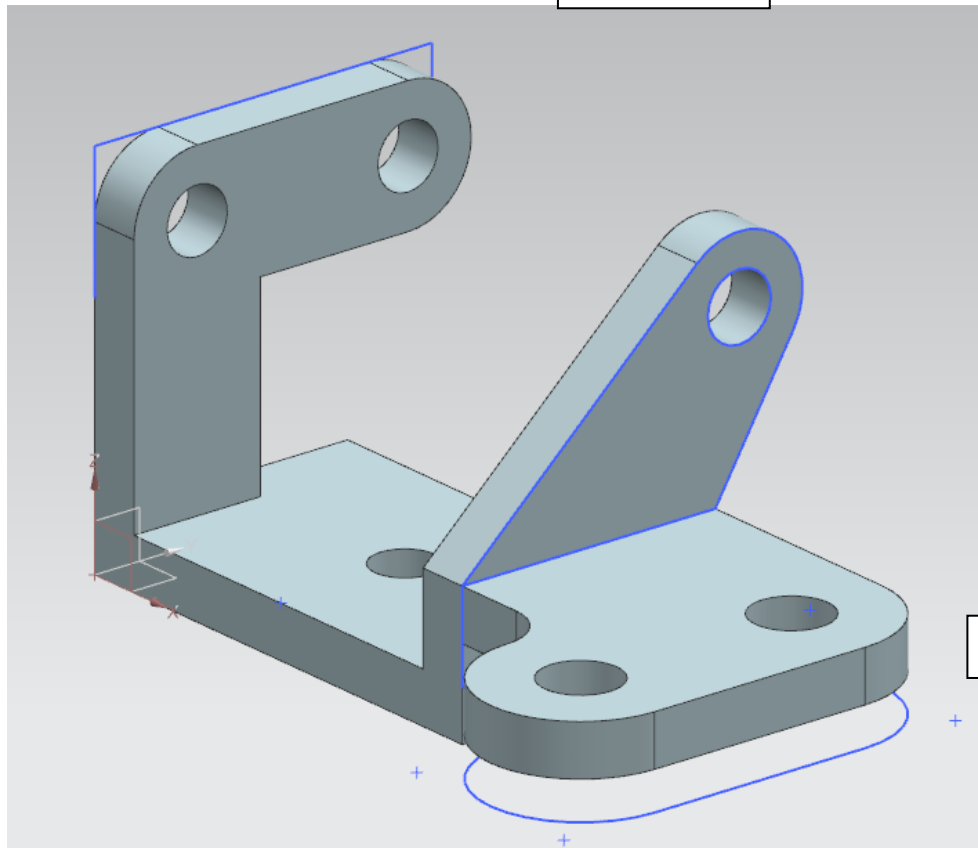
2. Create a model with NX10 using sketch as blow. Extrude the sketch with 10mm thickness. (unit mm)



ABOVE AVERAGE

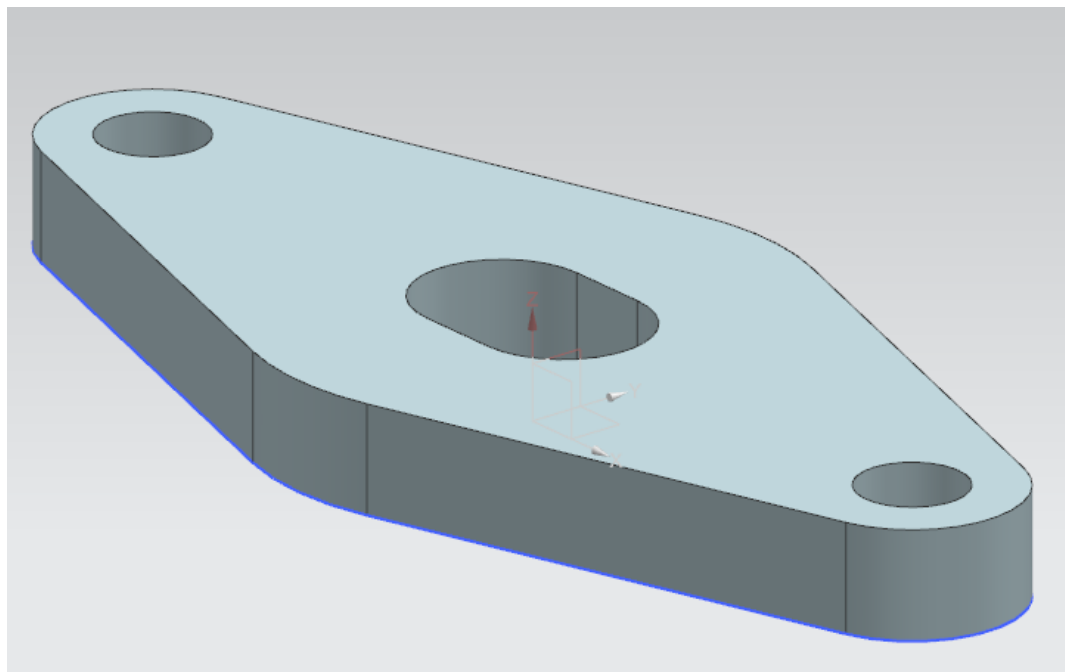
P1.

98



Holes off -2

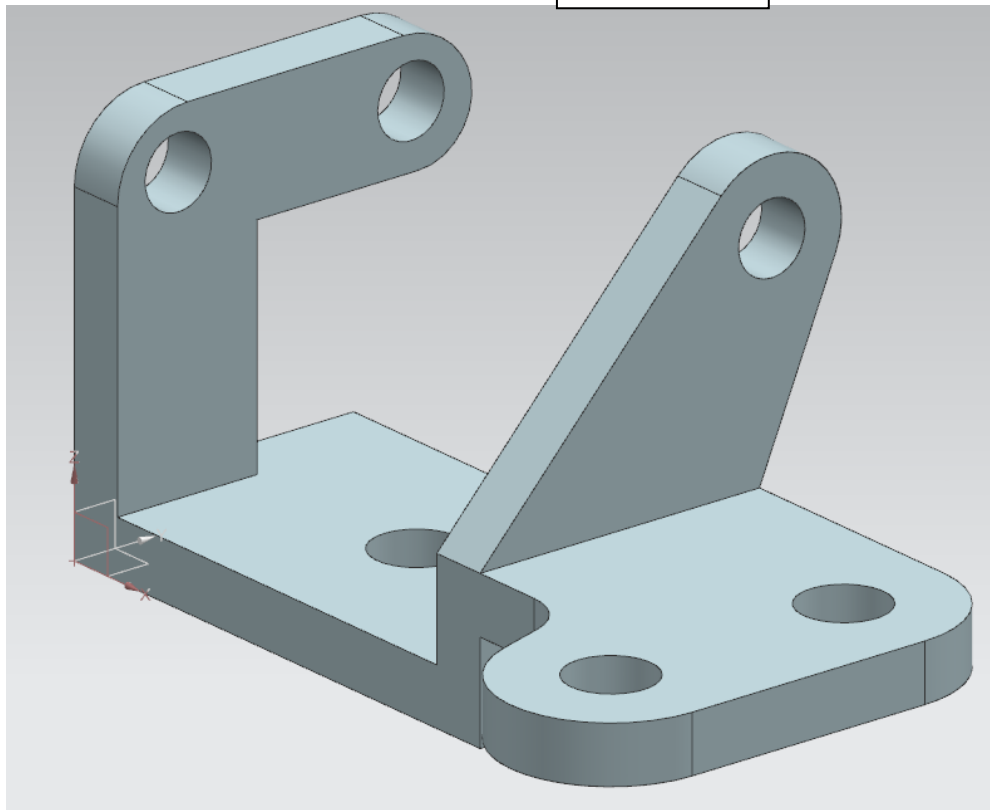
P2.



AVERAGE

P1.

91

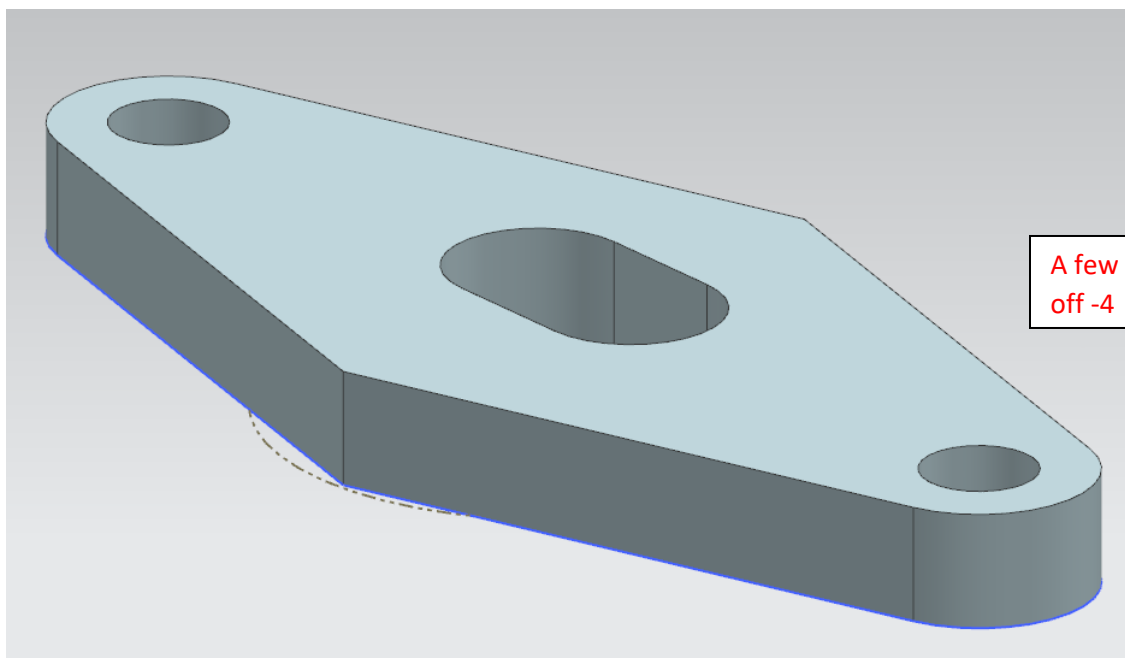


Left feature -2pt

Middle feature -2pt

Fillet 16 -1pt

P2.

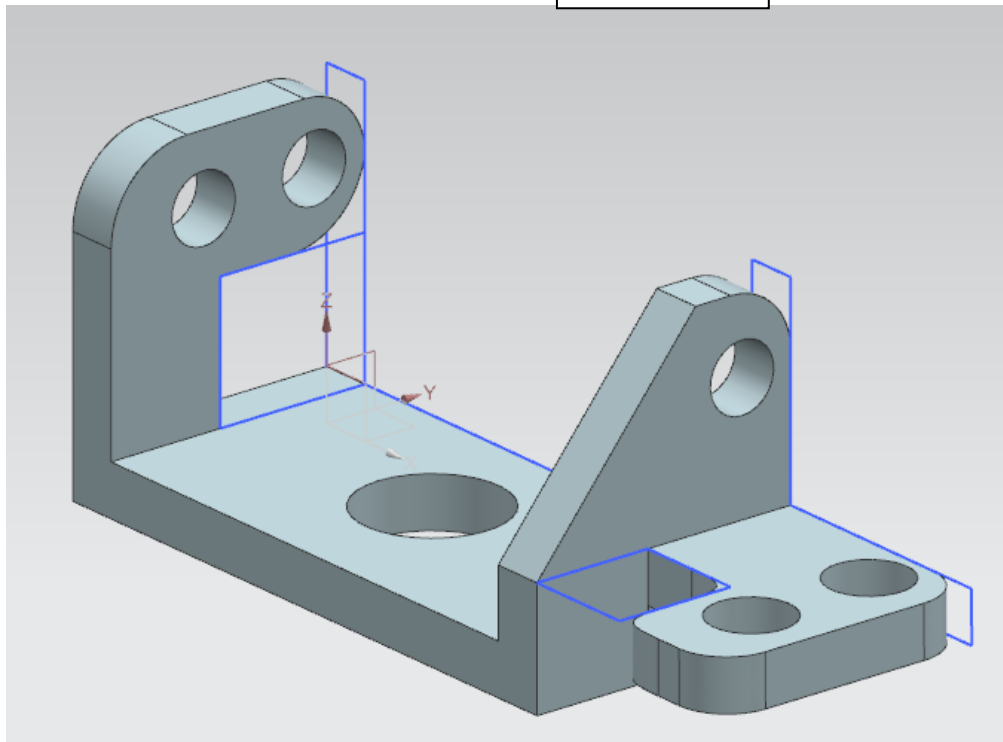


A few dimensions
off -4

BELOW AVERAGE

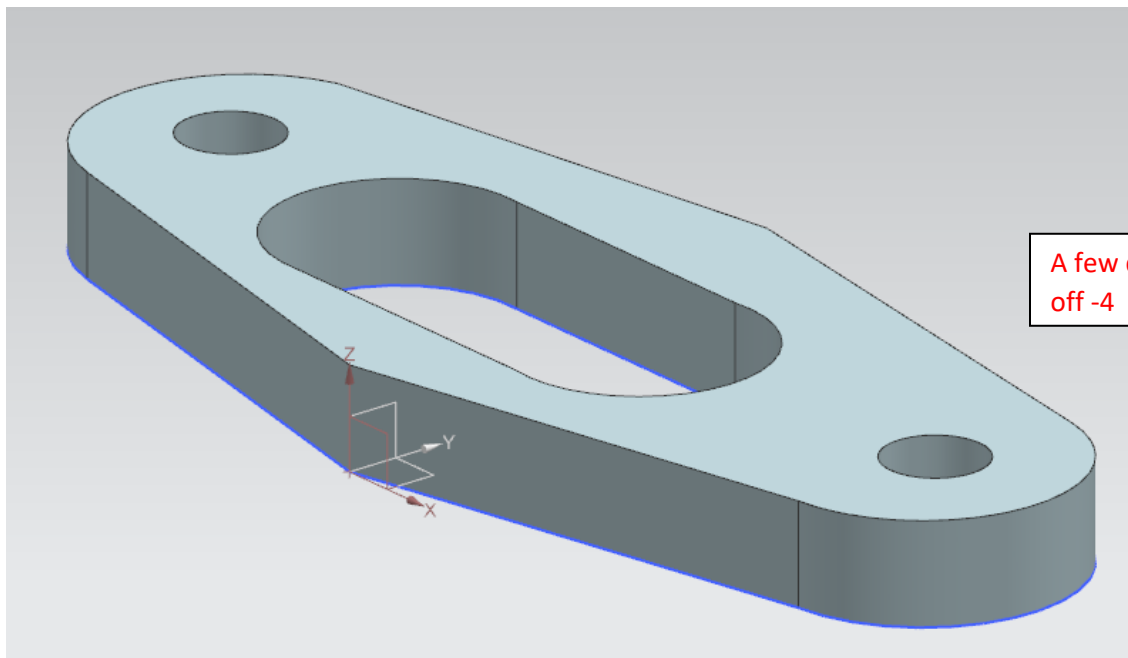
P1.

81



Left feature -4pt
Middle feature -4pt
Right feature -4pt
Other small dimensions
are off -3pt

P2.



A few dimensions
off -4

MECHANICAL ENGINEERING DRAWINGS FALL 2021

Project #1

TOPICS COVERED IN PROJRCT #1

- 1. Solid Modeling**
- 2. Drafting**

MCEG1102-P04: Mechanical Engineering Drawing I

Fall 2021

Project 1 Assigned on 10/25/2021

This project includes 2 parts. Part I is to design a solid model as shown in page 2. Part II is to create a drafting as shown in page 3. **Unit is inch.**

Due Date:

Part I is due on **11/01/2021**.

Part II is due on **11/08/2021**.

Requirements:

Part I:

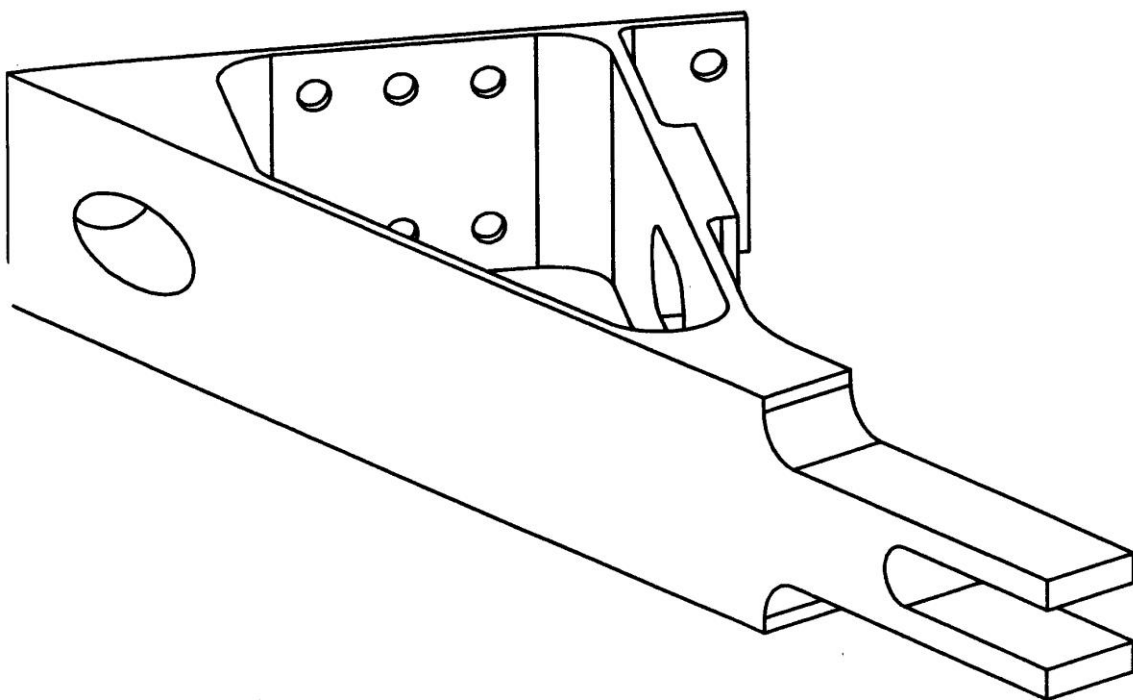
- Save your NX file. You will use it to finish your project Part II.

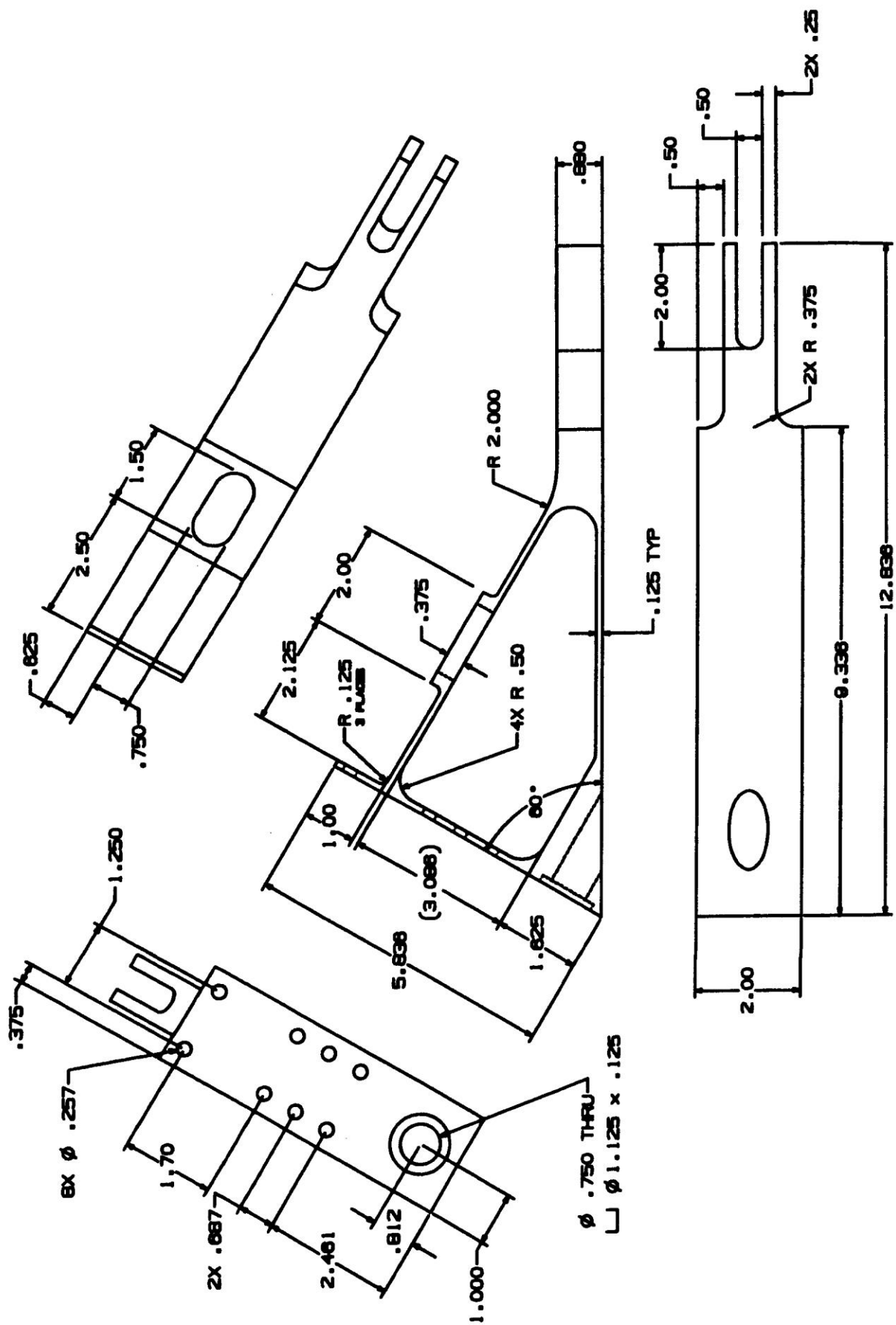
Part II:

- You need to list your name and student ID on the right bottom corner of your drafting.

Submission:

- You need to submit electronic copies of Part I and Part II on Canvas.
- You need to submit electronic copies on Taskstream (Taskstream can be accessed on Ecourses).
 - Submit your Part II file to **“Outcome 2”**.
 - **Taskstream submission is in addition to Ecourses submission. You need to submit electronic copy of Part II twice to both Ecourses and Taskstream.**
- The file names should be **Project1_model_lastname.prt** for Part I and **Project1_drafting_lastname.prt** for Part II.

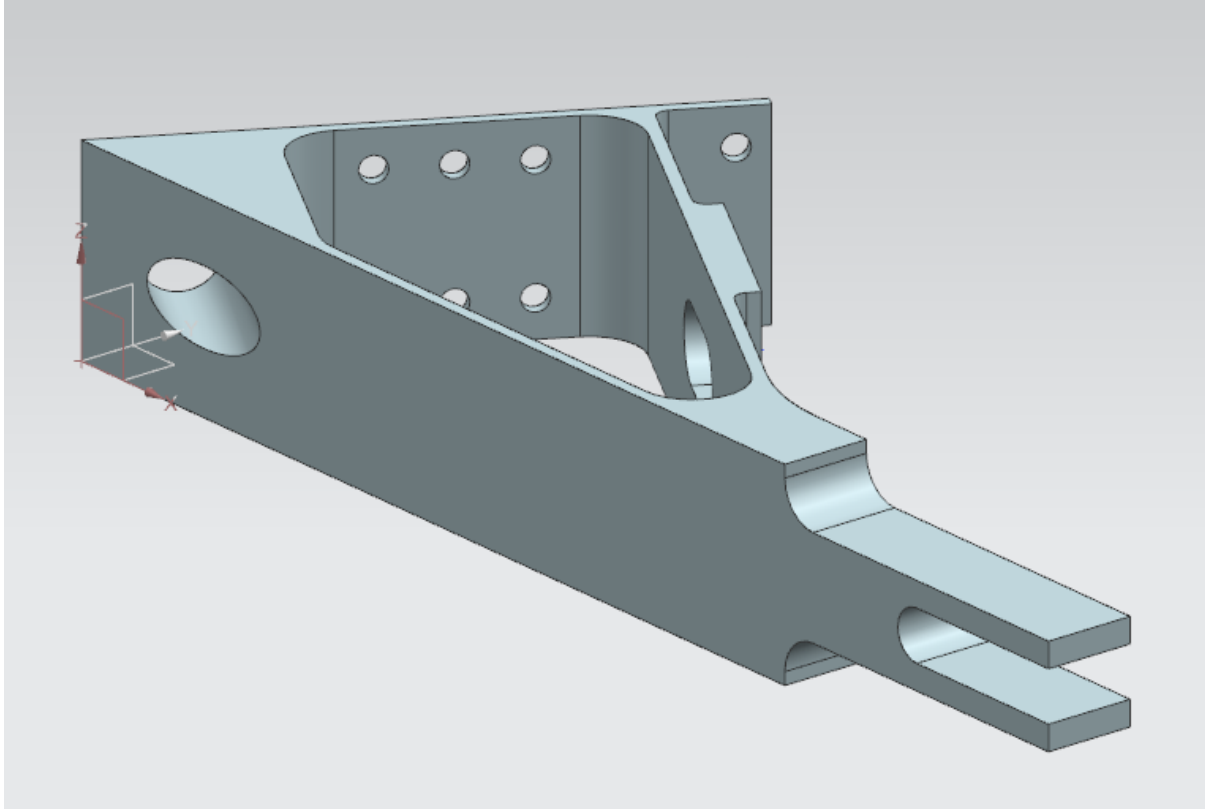




ABOVE AVERAGE

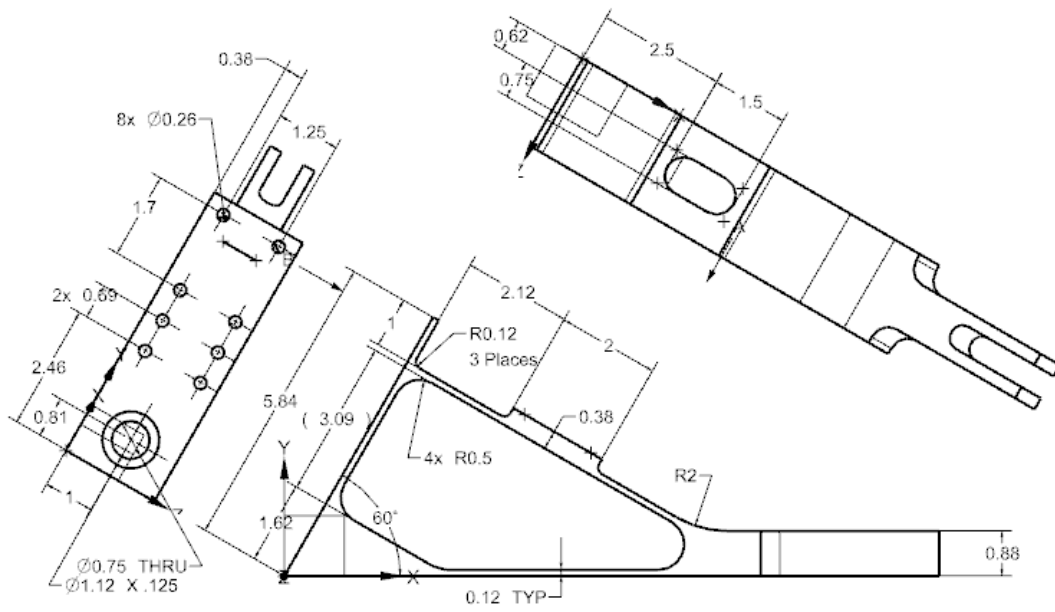
Part1.

100

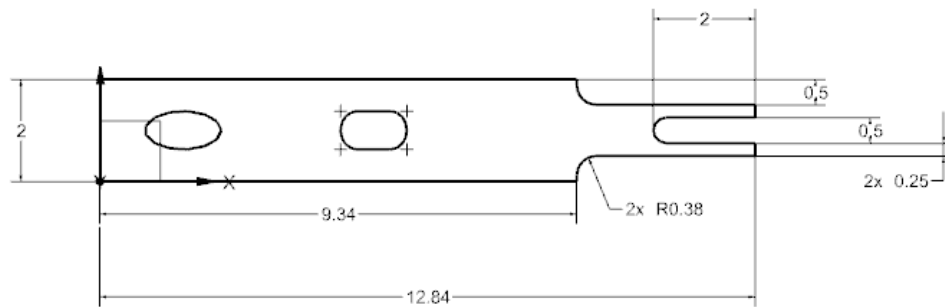


Part2.

95



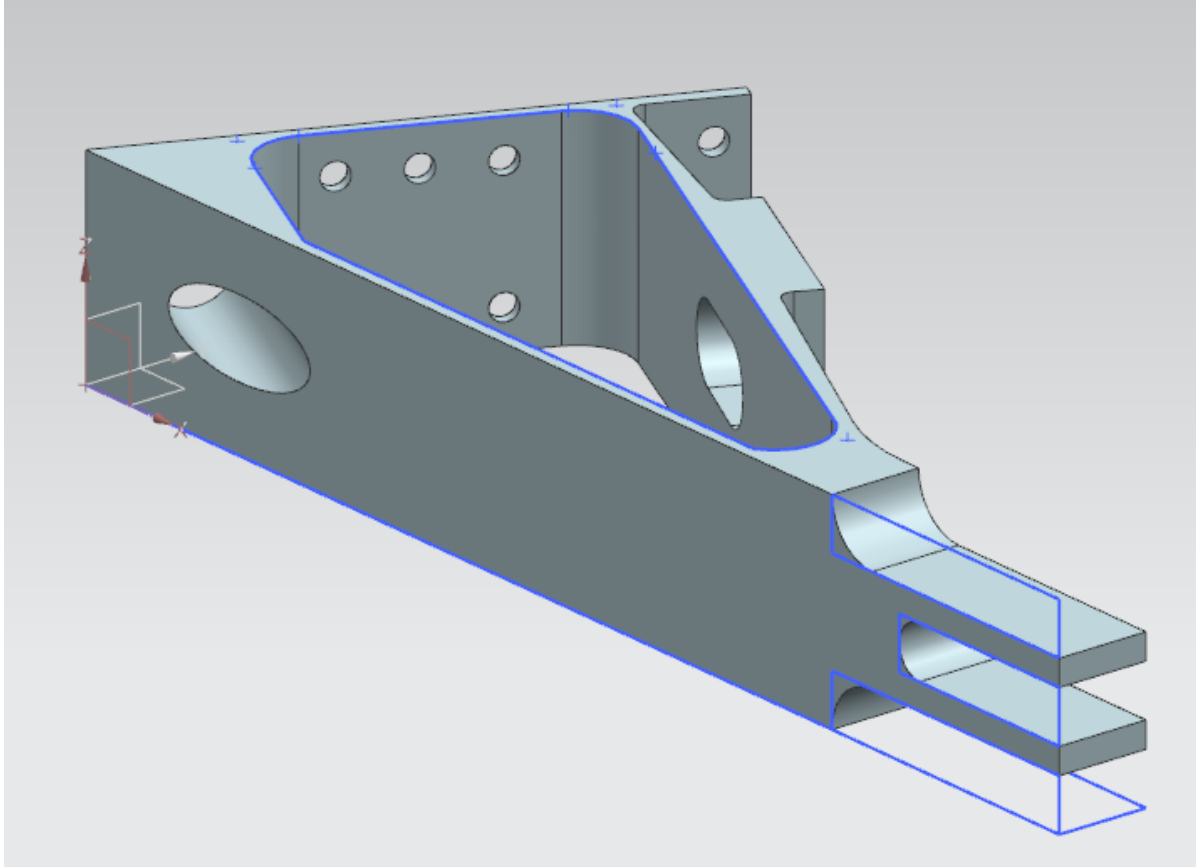
Decimal off



AVERAGE

Part1.

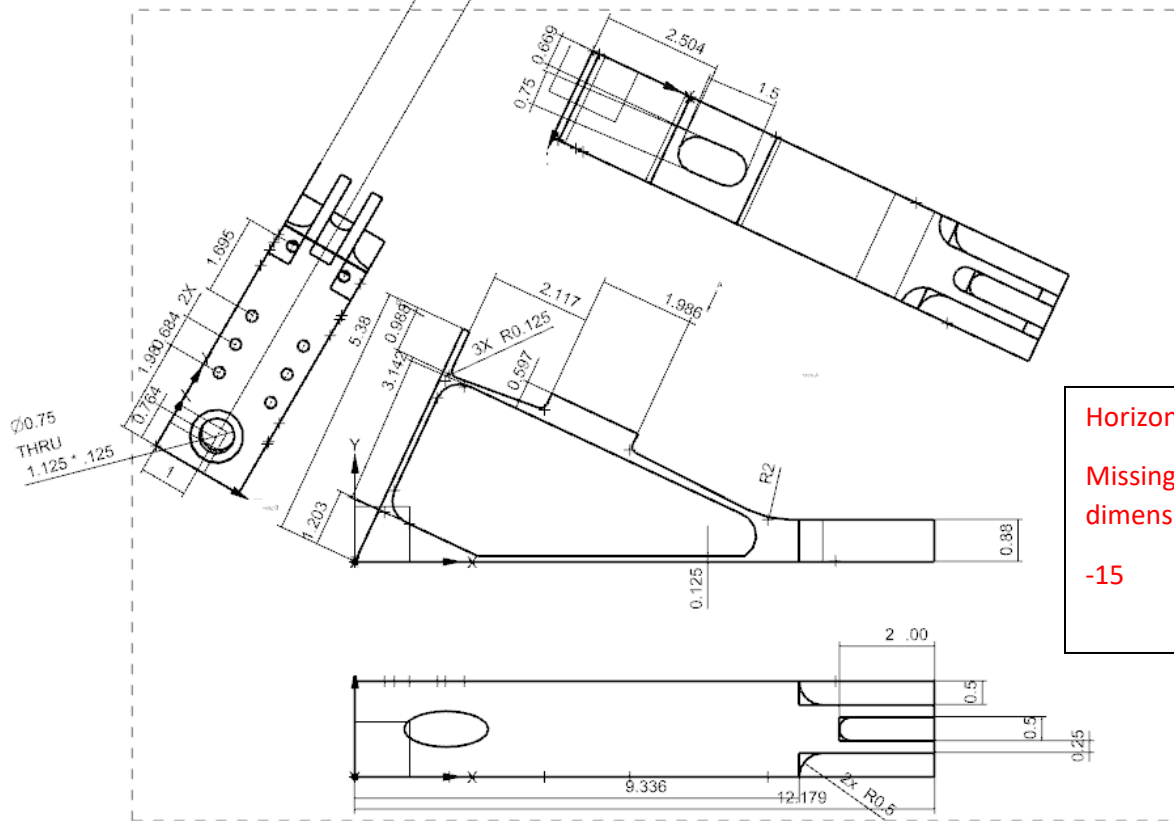
90



Angle and a few dimensions off -10

Part2.

85



Horizontal text

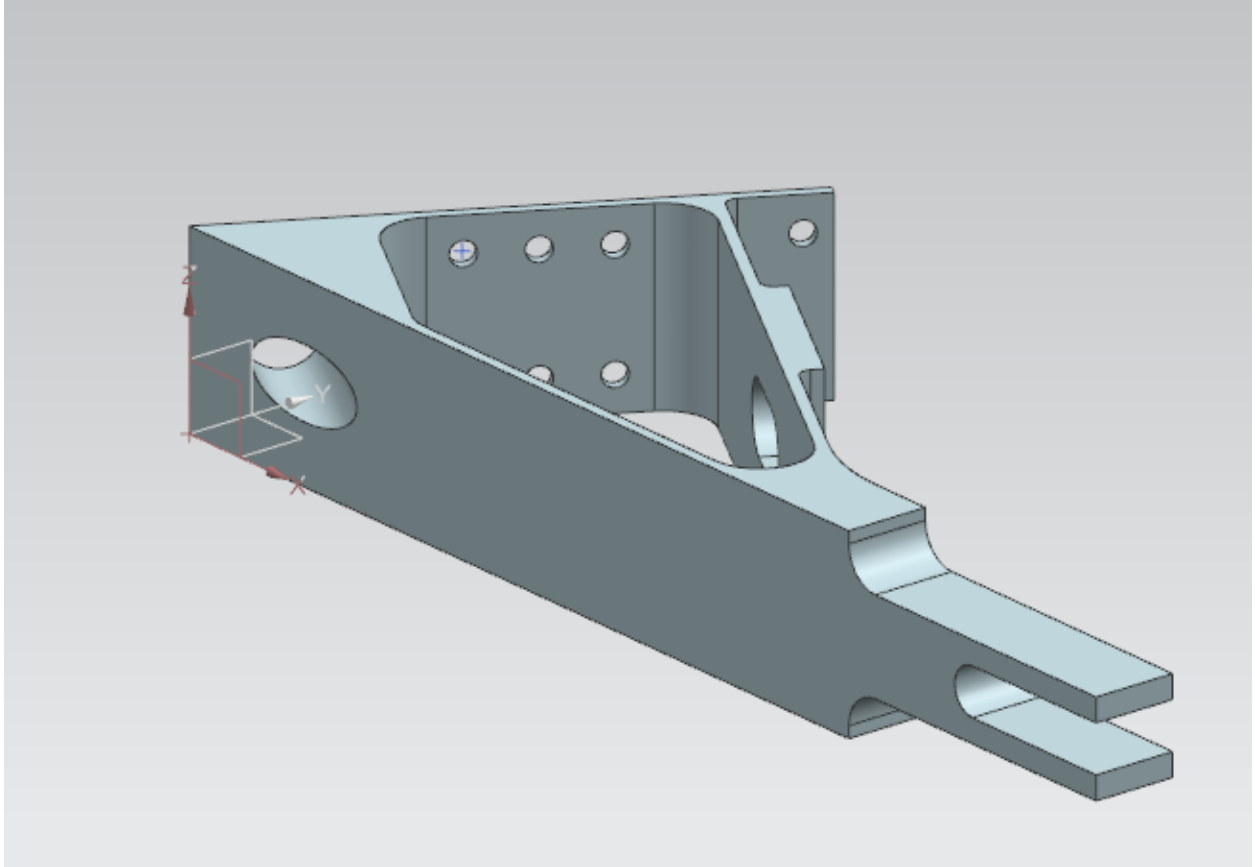
Missing a few
dimensions

-15

BELOW AVERAGE

Part1.

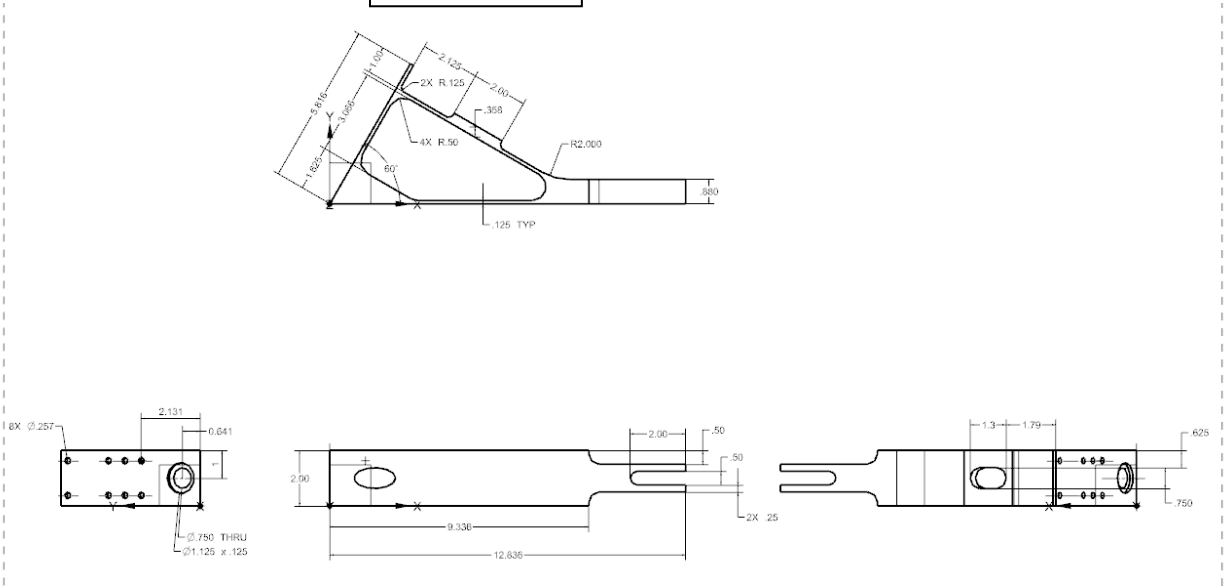
98



A few dimensions off -2

Part2.

75



Views are not following project statement -25

**MECHANICAL ENGINEERING DRAWINGS
FALL 2021**

Project #2

TOPICS COVERED IN PROJRCT #2

- 1. Solid Modeling**
- 2. Assembly**

MCEG1102-P04 Mechanical Engineering Drawing I

Fall 2021

Project 2: Impeller Assembly

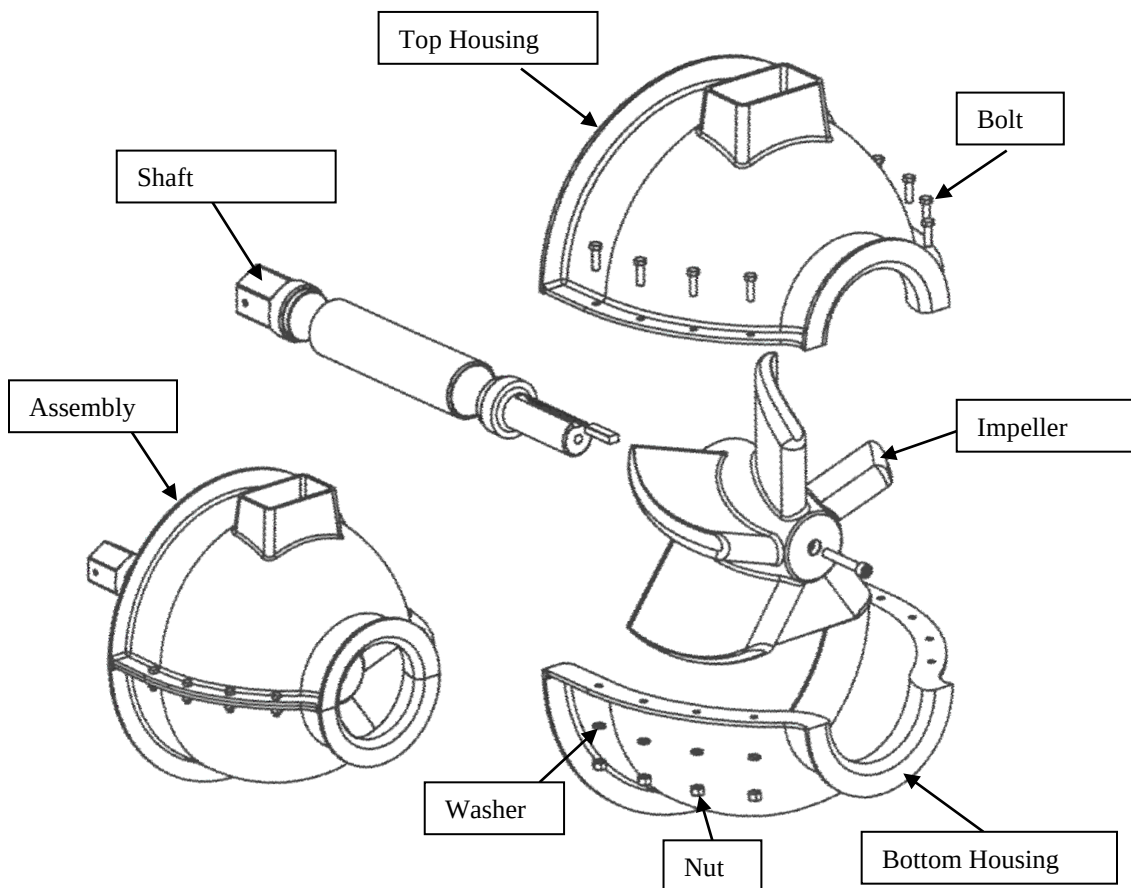
Assigned on 11/8/2021

Due on 11/29/2021

Total Points: 200

I. Project Description

The Impeller assembly is a conceptual design for a mechanism that is to translate water flow into axle rotation which could then be used to drive another device. Below is an illustration of the Impeller assembly that you will model.



II. Design Tasks

You are required to design the following parts:

1. One **Top Housing**; (You also need to decide the dimensions of the inspection port on the top housing.)
2. One **Bottom Housing**;
3. One **Impeller**;
4. One **Shaft**;
5. **Bolts**; The bolt is suggested to be 0.5 diameter x 1.75 long. You are required to find out other dimensions for the hexagonal head **using the Appendix Table A-29**.
6. **Washer**; The Washer is to be selected and modeled according to the bolt size **using the Appendix Table A-32**.
7. **Nut**; The Nut is to be selected and modeled according to the bolt size **using the Appendix Table A-31**.
8. Once you have all the parts modeled, the last step is the **assembly**.

The subsequent pages will help you design the **Housing, Impeller, Bolt, Washer, and Nut**.

Some dimensions are provided below to give you an idea of the recommended size.

1. The flange thickness of the impeller housing is suggested around 0.5 inches.
2. The flange width is suggested to be $1 + 3 \times \text{bolt diameter} = 2.5$ inches.
3. The addition of the end flanges should not increase the length of the impeller housing.
4. You need to decide on the clearance between the bolt and the hole.

III. Project Submission

1. You need to submit **electronic copies of the following on Ecourses**.
 - Report;
 - All NX files **as one compressed file** including your models and assembly.

IV. Report Format

The report should at least include the following sections:

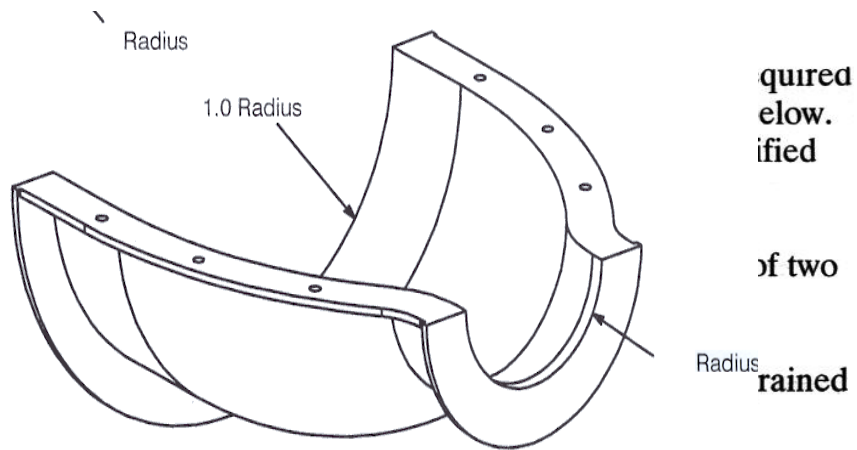
- a. Cover page;
- b. Problem Description;
- c. 3D NX Models of Individual Components: (You will need to explain how do you select the dimensions of the bolt, washer, and nets)
- d. 3D NX Models of Final Assembly: (You will briefly describe how do you complete the assembly.)
- e. Conclusion.

IV. Grading

Modeling of individual components: 120; Assembly: 50;

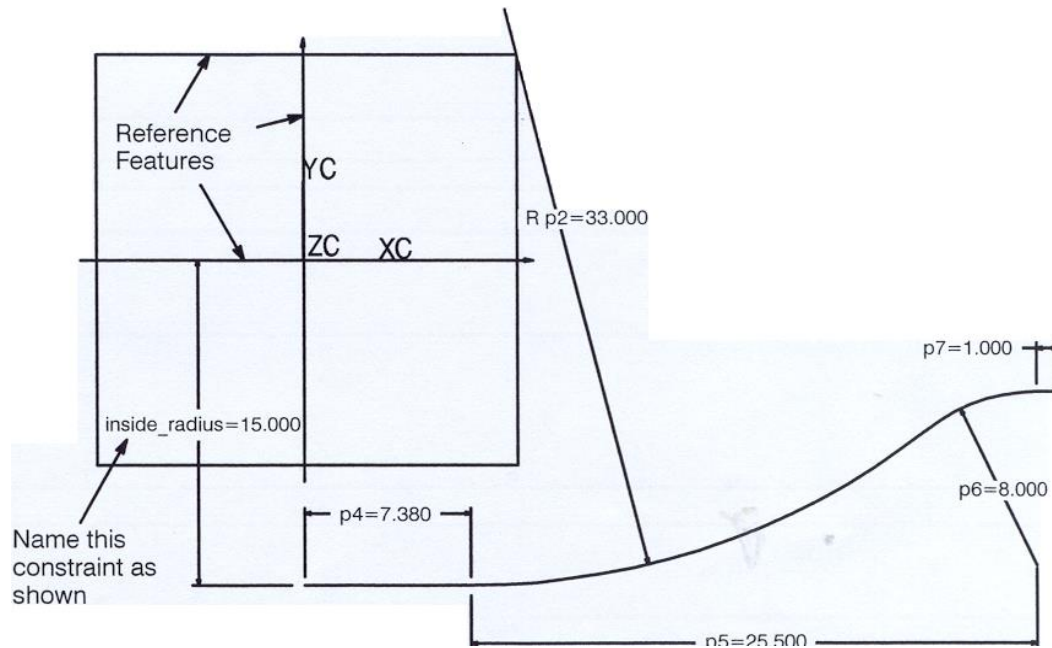
Report: 30; Total: 200.

A1. Modeling of Housing



☐ In the Edge Blend dialog, toggle Add Tangent Edges On cated

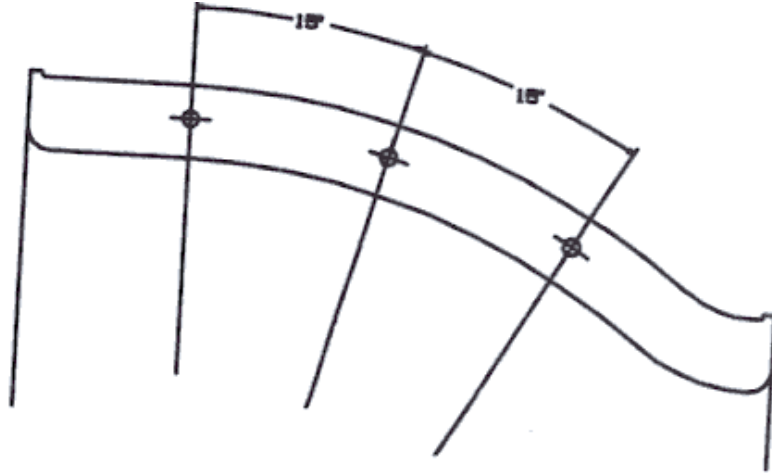
The two lines should have horizontal constraints.



The final shape of the bottom housing is shown above. Blend the edges highlighted by “Radius”. You may want to accept the 1.0 Radius as shown or decide on your own. In each case you need to mention about that in the report.

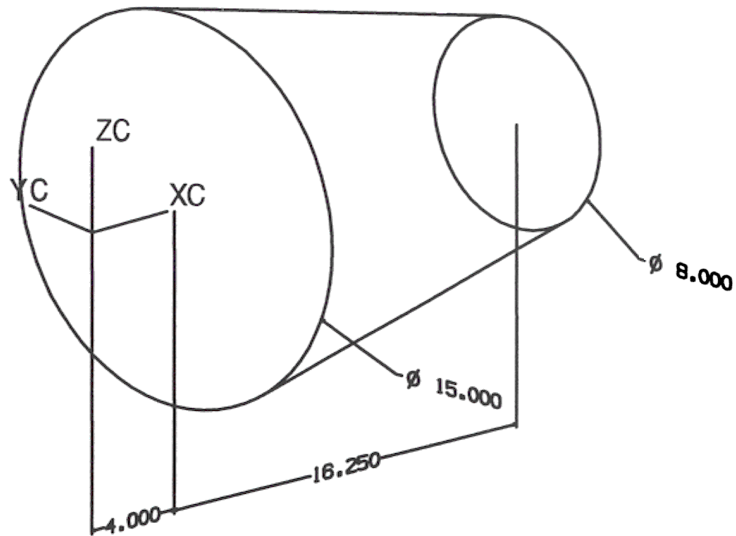
Make a circular array of the holes as shown below.

Use the suggested dimensions for the flange thickness and width.

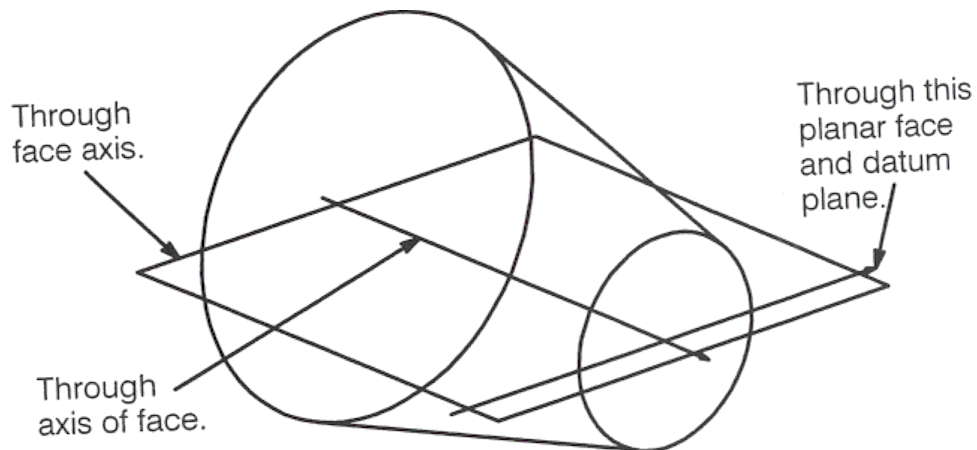


A2. Impeller

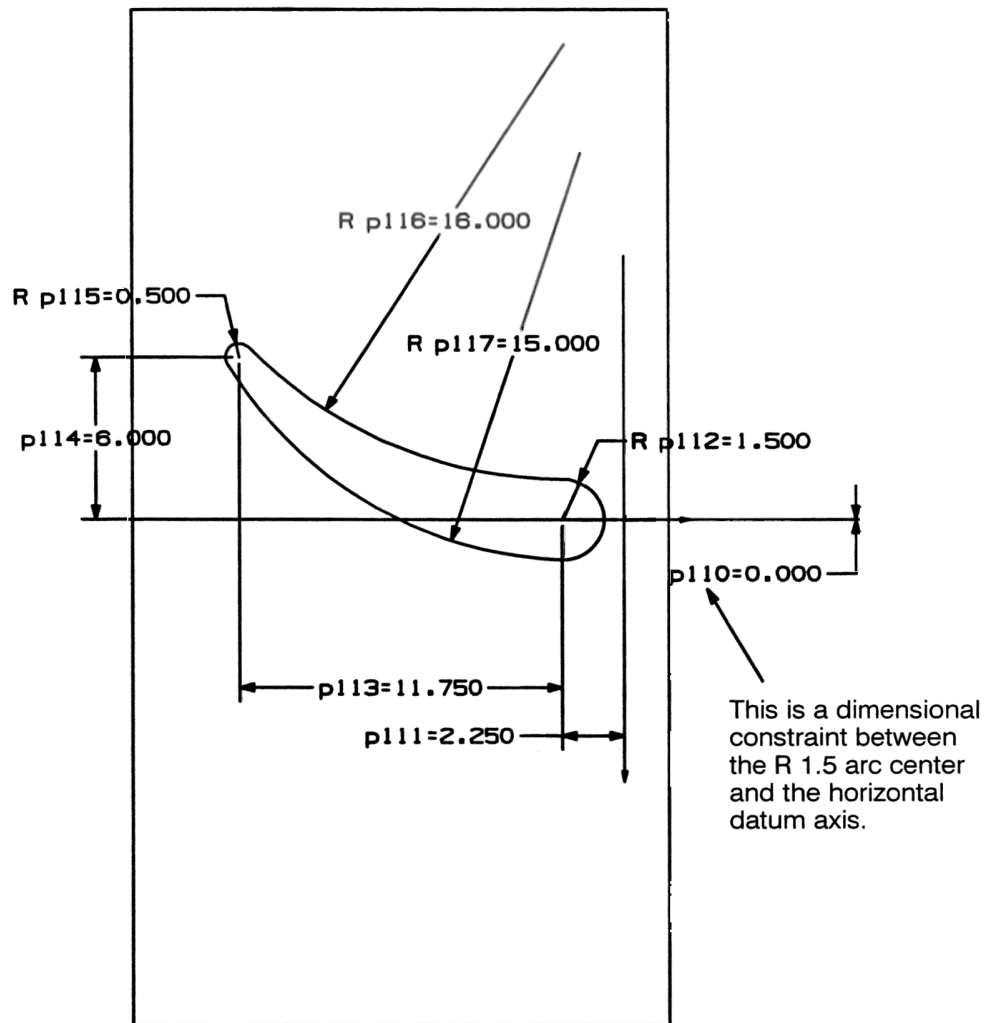
- ❑ Create the cone to the specifications and orientation as shown below. The WCS is shown in the absolute coordinate orientation and location of 0,0,0.



Create the center plane for sketching the impeller blade as shown below:



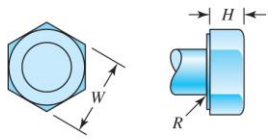
- ☐ Create the dimensional constraints as illustrated below.



A3. Bolt

Table A-29

Dimensions of Square and Hexagonal Bolts



Nominal Size, in	Square		Regular Hexagonal		
	W	H	W	H	$R_{\min}$
$\frac{1}{4}$	$\frac{3}{8}$	$\frac{11}{64}$	$\frac{7}{16}$	$\frac{11}{64}$	0.01
$\frac{5}{16}$	$\frac{1}{2}$	$\frac{13}{64}$	$\frac{1}{2}$	$\frac{7}{32}$	0.01
$\frac{3}{8}$	$\frac{9}{16}$	$\frac{1}{4}$	$\frac{9}{16}$	$\frac{1}{4}$	0.01
$\frac{7}{16}$	$\frac{5}{8}$	$\frac{19}{64}$	$\frac{5}{8}$	$\frac{19}{64}$	0.01
$\frac{1}{2}$	$\frac{3}{4}$	$\frac{21}{64}$	$\frac{3}{4}$	$\frac{11}{32}$	0.01
$\frac{5}{8}$	$\frac{15}{16}$	$\frac{27}{64}$	$\frac{15}{16}$	$\frac{27}{64}$	0.02
$\frac{3}{4}$	$1\frac{1}{8}$	$\frac{1}{2}$	$1\frac{1}{8}$	$\frac{1}{2}$	0.02
1	$1\frac{1}{2}$	$\frac{21}{32}$	$1\frac{1}{2}$	$\frac{43}{64}$	0.03

A4. Nut

Table A-31

Dimensions of
Hexagonal Nuts

Nominal Size, in	Width W	Height H	
		Regular	Hexagonal
$\frac{1}{4}$	$\frac{7}{16}$	$\frac{7}{32}$	
$\frac{5}{16}$	$\frac{1}{2}$	$\frac{17}{64}$	
$\frac{3}{8}$	$\frac{9}{16}$	$\frac{21}{64}$	
$\frac{7}{16}$	$\frac{11}{16}$	$\frac{3}{8}$	
$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{16}$	
$\frac{9}{16}$	$\frac{7}{8}$	$\frac{31}{64}$	
$\frac{5}{8}$	$\frac{15}{16}$	$\frac{35}{64}$	
$\frac{3}{4}$	$1\frac{1}{8}$	$\frac{41}{64}$	
$\frac{7}{8}$	$1\frac{5}{16}$	$\frac{3}{4}$	
1	$1\frac{1}{2}$	$\frac{55}{64}$	

A5. Washer

Table A-32

Basic Dimensions of
American Standard
Plain Washers (All
Dimensions in Inches)

Fastener Size	Washer Size	Diameter		Thickness
		ID	OD	
#6	0.138	0.156	0.375	0.049
#8	0.164	0.188	0.438	0.049
#10	0.190	0.219	0.500	0.049
#12	0.216	0.250	0.562	0.065
$\frac{1}{4}$ N	0.250	0.281	0.625	0.065
$\frac{1}{4}$ W	0.250	0.312	0.734	0.065
$\frac{5}{16}$ N	0.312	0.344	0.688	0.065
$\frac{5}{16}$ W	0.312	0.375	0.875	0.083
$\frac{3}{8}$ N	0.375	0.406	0.812	0.065
$\frac{3}{8}$ W	0.375	0.438	1.000	0.083
$\frac{7}{16}$ N	0.438	0.469	0.922	0.065
$\frac{7}{16}$ W	0.438	0.500	1.250	0.083
$\frac{1}{2}$ N	0.500	0.531	1.062	0.095
$\frac{1}{2}$ W	0.500	0.562	1.375	0.109
$\frac{9}{16}$ N	0.562	0.594	1.156	0.095
$\frac{9}{16}$ W	0.562	0.625	1.469	0.109
$\frac{5}{8}$ N	0.625	0.656	1.312	0.095
$\frac{5}{8}$ W	0.625	0.688	1.750	0.134
$\frac{3}{4}$ N	0.750	0.812	1.469	0.134
$\frac{3}{4}$ W	0.750	0.812	2.000	0.148
$\frac{7}{8}$ N	0.875	0.938	1.750	0.134
$\frac{7}{8}$ W	0.875	0.938	2.250	0.165
1 N	1.000	1.062	2.000	0.134
1 W	1.000	1.062	2.500	0.165

ABOVE AVERAGE

MCEG 1102-P04 Mechanical Engineering

Fall 2021

Project 2: Impeller Assembly

Kevin Biggers

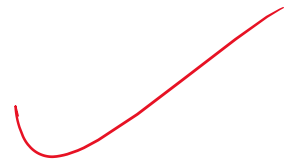
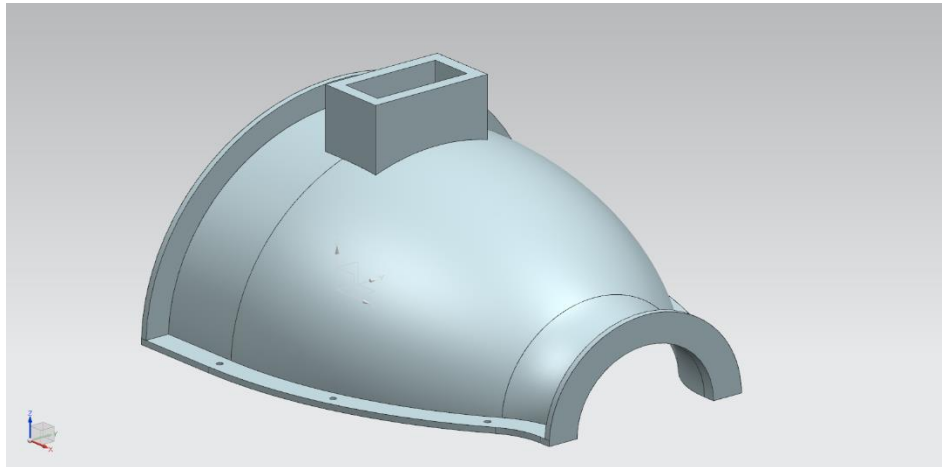
Prairie View A&M University

190/200

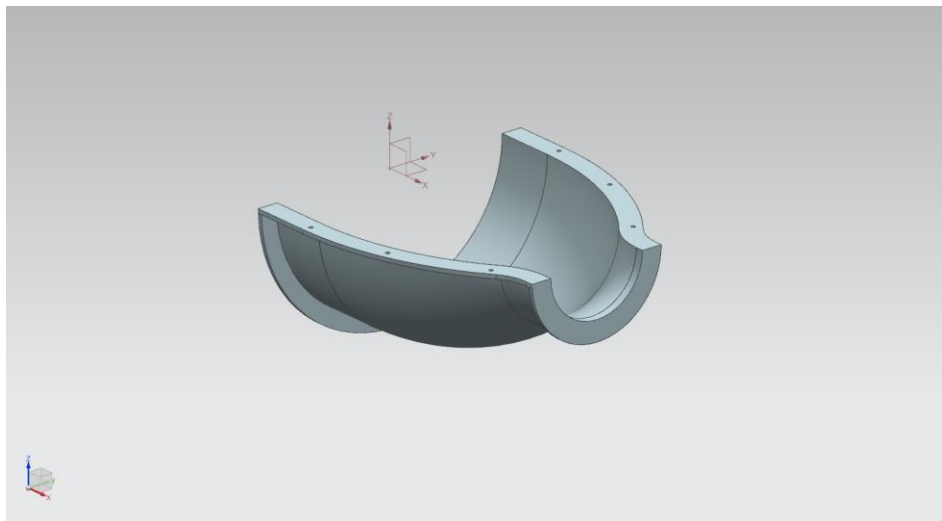
Problem Description

The Impeller Assembly is a conceptual design for a mechanism that is to translate water flow into axle rotation which could then be used to drive another device

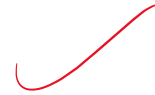
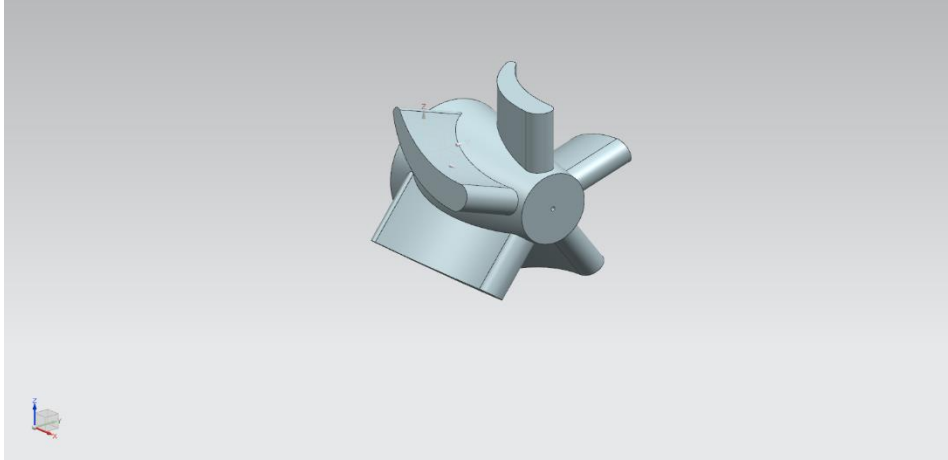
Top Housing



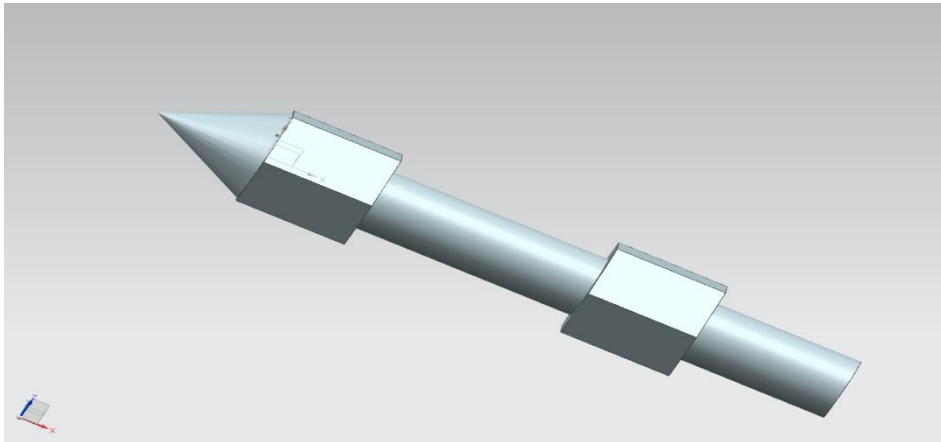
Bottom Housing



Impeller

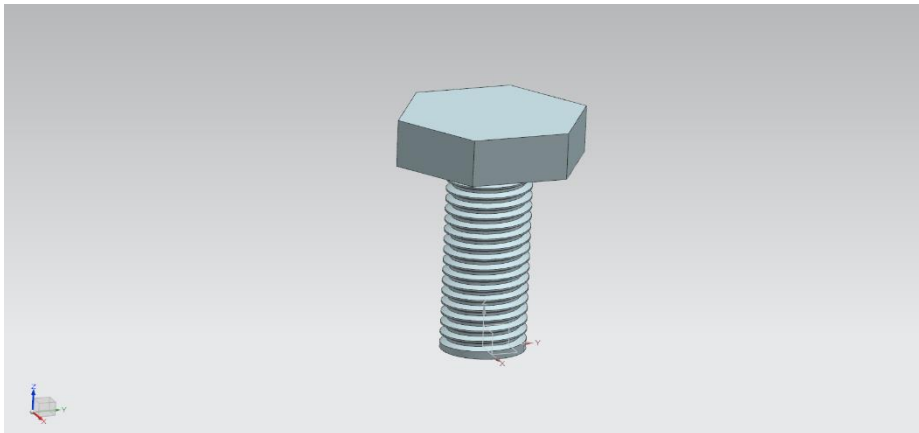


Shaft



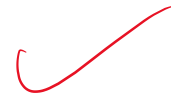
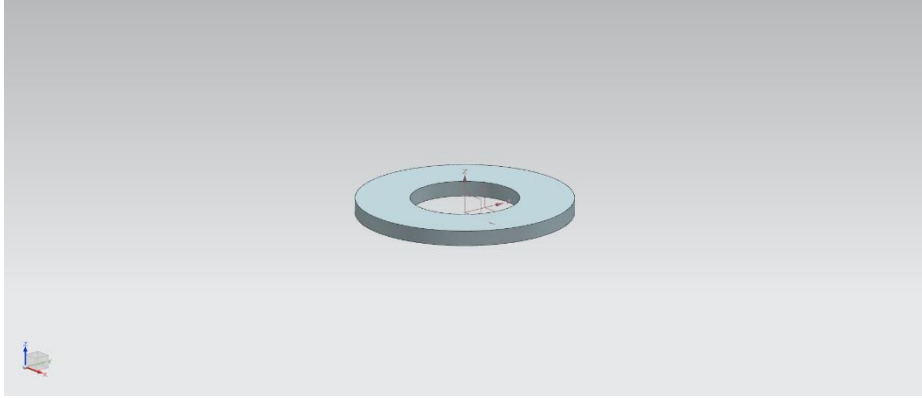
Bolt

To find the dimensions of the bolt I first looked at page 2 of the assignment packet and realized that the bolt is suggested to be .5 diameter x 1.75 long. To find the hexagonal head dimension, I looked at the Appendix Table A-29 and I chose the $\frac{1}{2}$ Nominal size because it corresponded to the diameter of $\frac{1}{2}$ or .5. Also, once I made the bolt, it looked proportional to assembly.



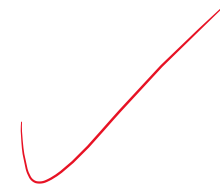
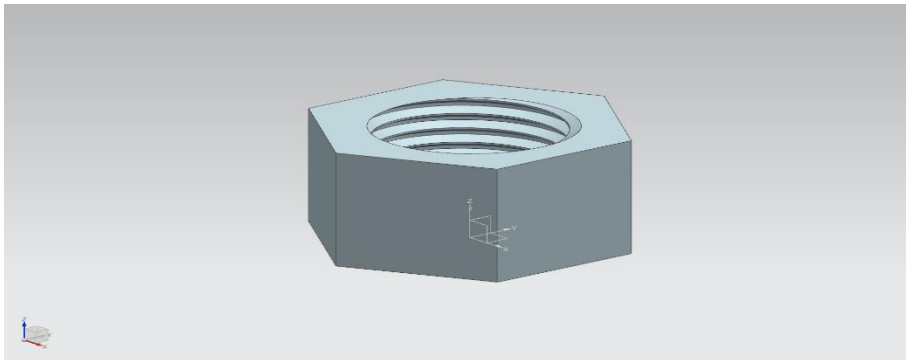
Washer

I selected the washer dimensions because the width of the washer corresponded with the width of the nut. The washer size I ended up choosing was ½ inch Nominal size. Lastly, once I made the washer on NX, I saw that the bolt, washer, and nut aligned well.



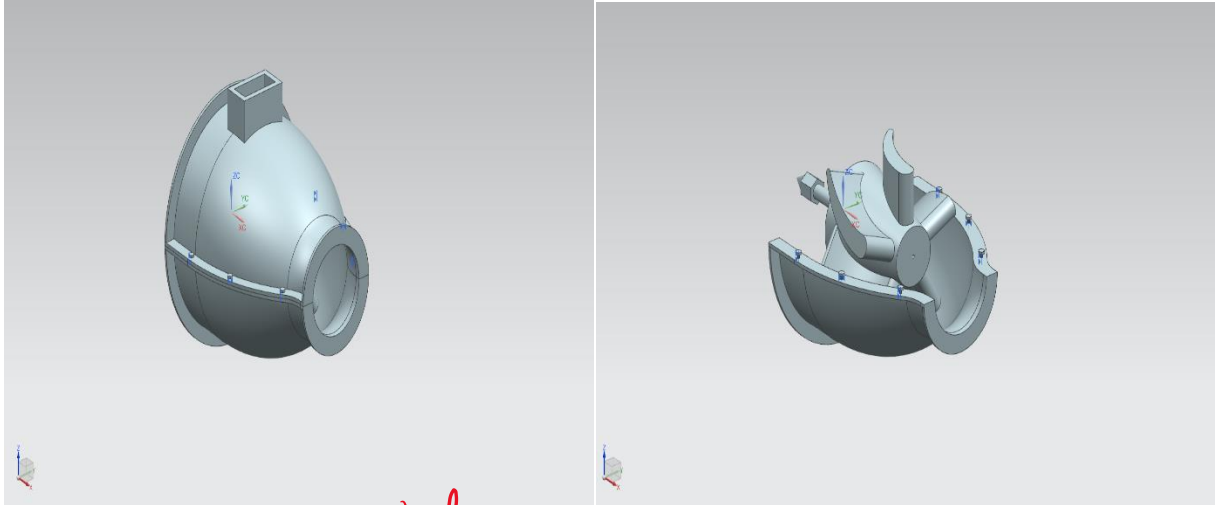
Nut

The nut dimension is ½ inches in Nominal size. I selected the nut dimension because the inner diameter of the nut fit the bolt and the thread



Assembly

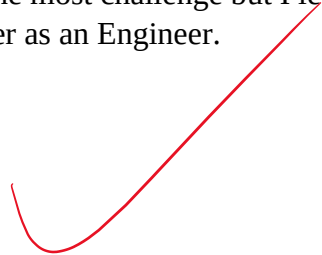
I completed the assembly by first assembling the bottom housing and the impeller. Once I completed that step, I added the top housing and the shaft. Lastly, I fastened the bolts, washers, and nuts in place.



Conclusion

missed some constraints -10

This project challenged my ability to correctly assemble parts, design, and thing in tuff situations. Project 2 was challenging but to overcome the obstacles I divided the project into smaller parts so that it was not overwhelming. I completed two parts per week and on the last week I worked on assembling all the parts and my report. The assembly brought me more hardships but once I completed it, I felt very relived and accomplished. Specifically, the new use of the constraints and aligning parts together brought the most challenge but I learned a fair amount of information that I can use in my future career as an Engineer.



AVERAGE

Lamont Landry

11/29/2021

MCEG 1102

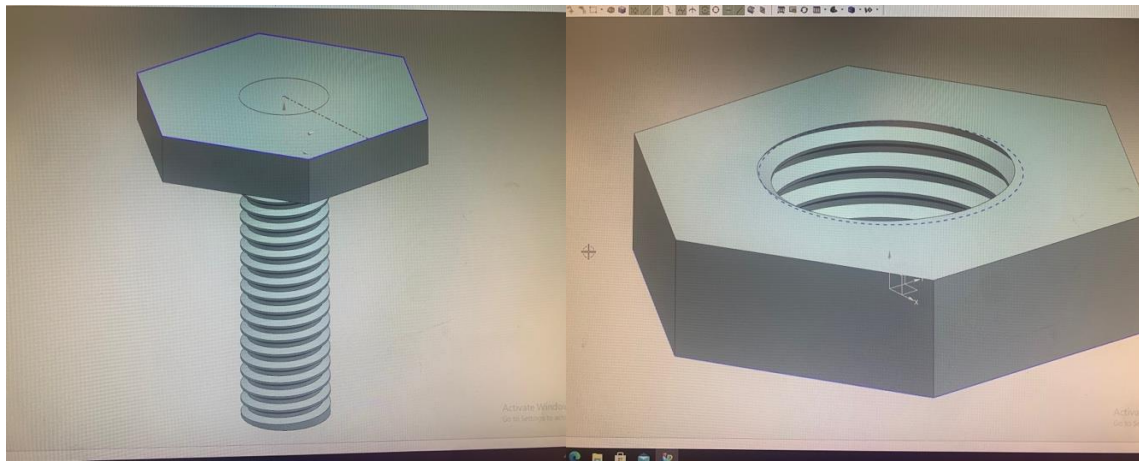
Professor Duan

Impeller Assembly

175/200

Problem description

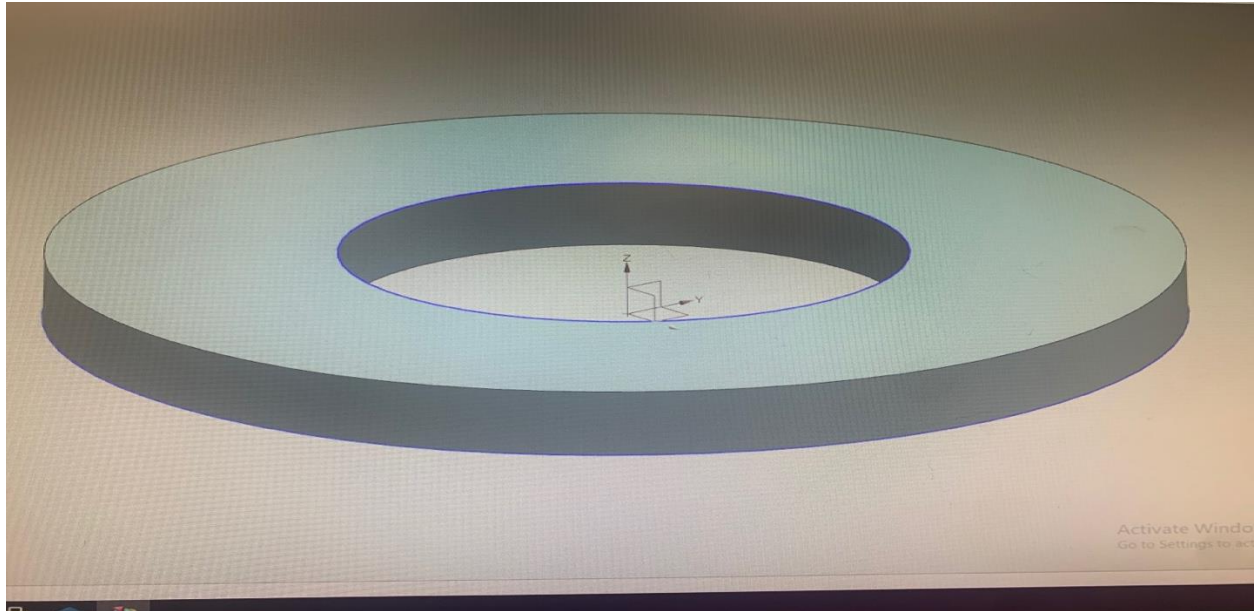
Students were tasked with the dilemma of constructing 7 different parts including the top and bottom housing, impeller, shaft, bolts, nuts and washers. After constructing these pieces, the students were then told to assemble the pieces to form one main object while including clearance all throughout the figure. Students were to use the packet and prior knowledge to build the pieces with the correct dimensions and a hint of creativity on the shaft as well.



- 3

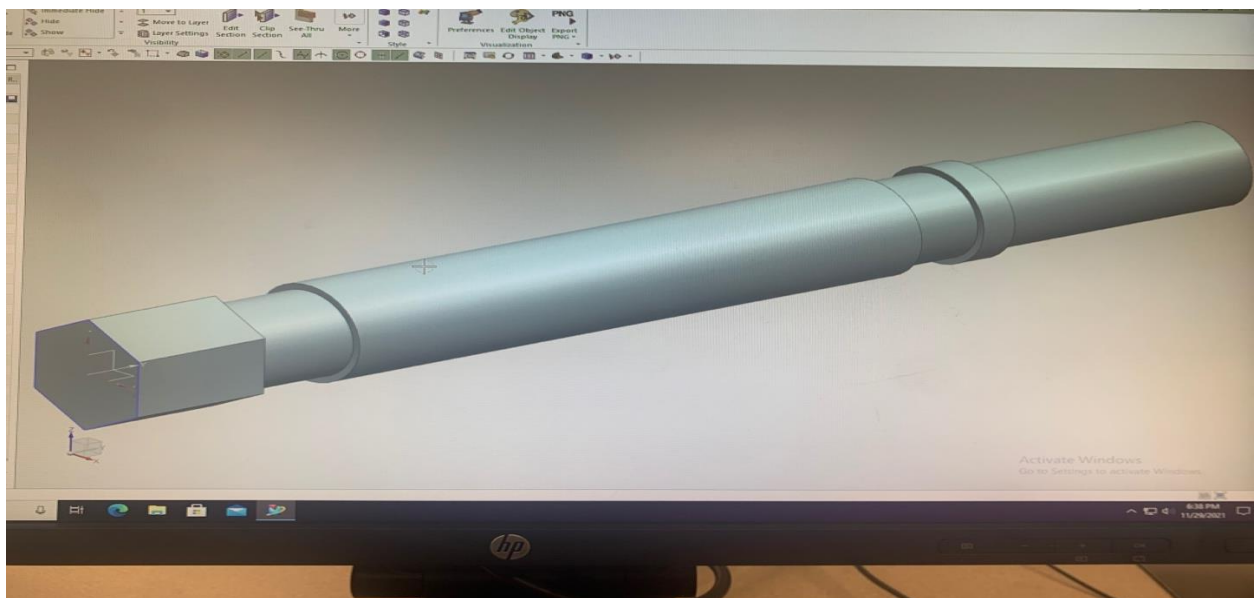
- 3

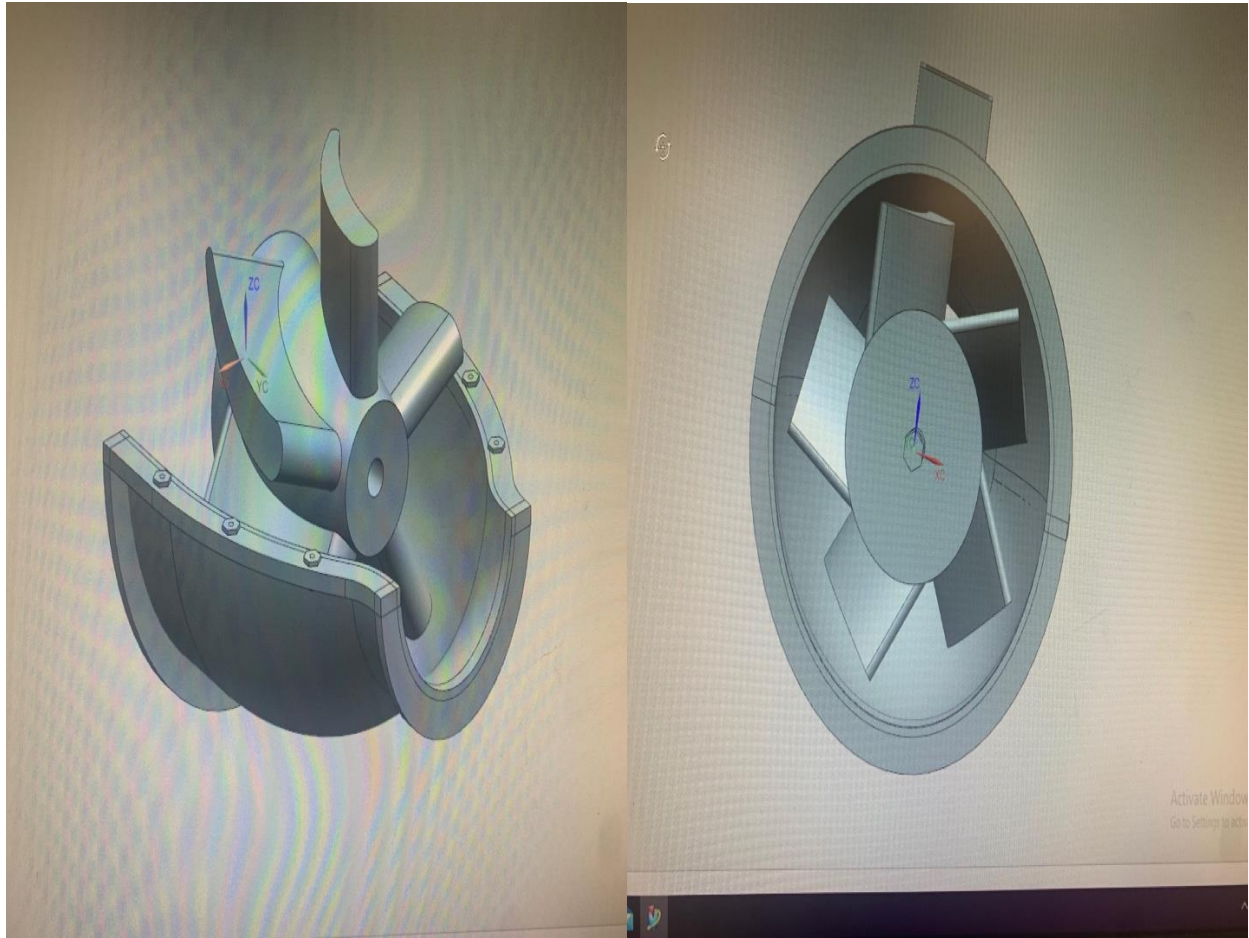
These two pieces above are pictures of the bolt and nut that was used throughout the assembly of my impeller. To build the screw was fairly easy since the dimensions of various sizes were in the instruction packet. The hexagonal top was created from a sketch and then a cylinder was attached to it. Lastly, a thread was added to the cylinder to give you what you see now. The nut is similar to the bolt as well other than the fact that a circle was placed inside the hexagon and subtracted from the hexagon.



The washer also had various sizes and dimensions to choose from on the instruction packet but the washer is basically just a circle extruded with another smaller circle subtracted from the first one. The washer, bolt and nuts were all created with the $\frac{1}{2}$ dimensions.

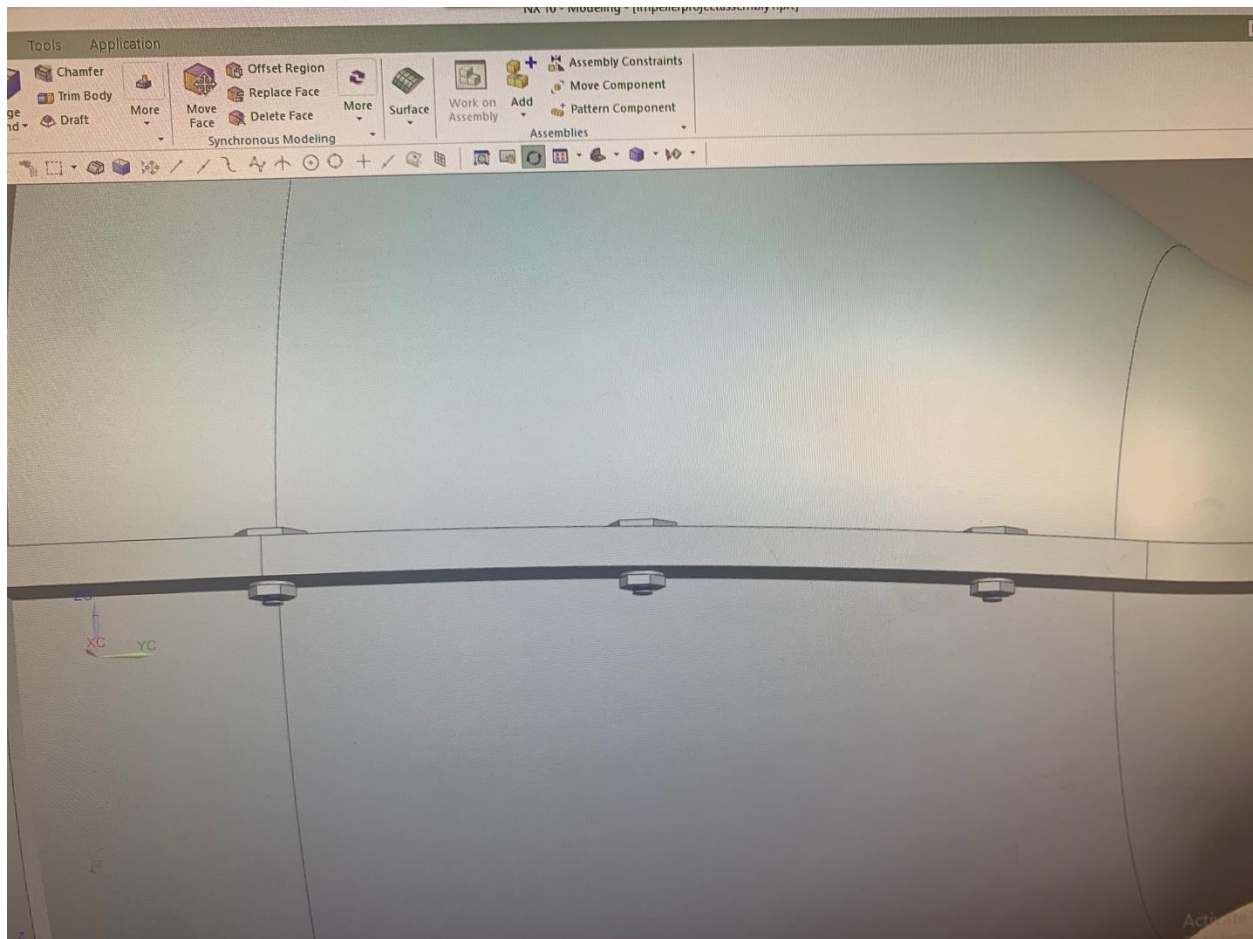
- 3



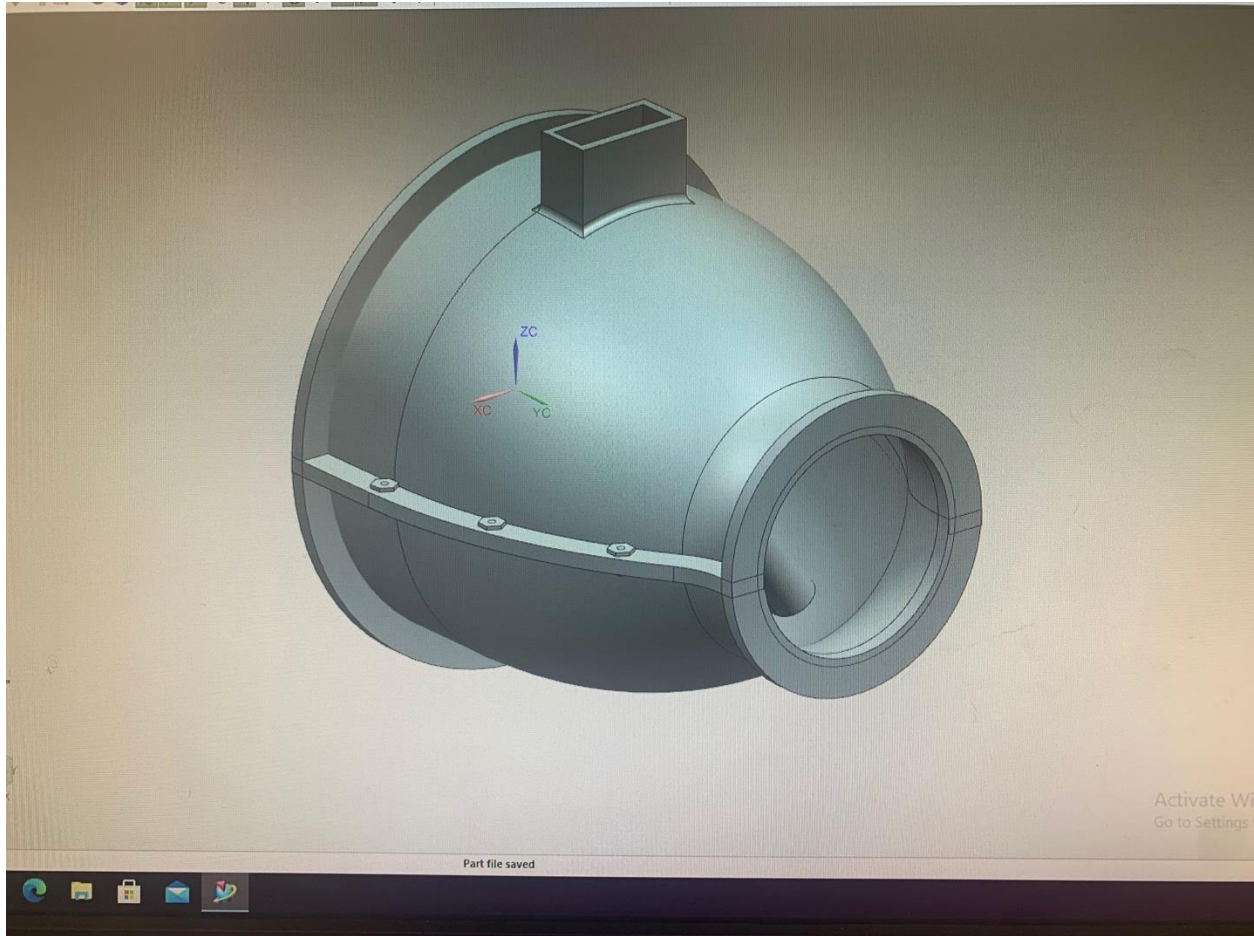


The first picture from the left being shown is the first two steps of the impeller assembly. To do this, all I did was enter assembly mode and choose my bottom housing and impeller part and placed them in the space using absolute origin to correctly place them. The second picture shows the next to steps which is placing the top housing part and shaft. To place these parts I also used the same method.

Top, bottom housing - 6
Assembly missing constraints - 10



The last step is to place all the bolts, nuts and washers in their corresponding areas and to do this I just selected the wholes that I created on my housing parts and placed the bolts in. once done the nuts and washers were placed on the same way from the bottom with the washer always going first.



This is the finished product of the impeller assembly with all the required parts in all their corrective places as well.

Conclusion

overall, this project was very interesting and had many various challenges that needed to be overcome in order to complete the assignment correctly and on time. This project also gave much insight into what the design process of creating a figure really is.

BELOW AVERAGE

MCEG1102-P04 Mechanical Engineering Drawing 1

Fall 2021

Project 2: Impeller Assembly

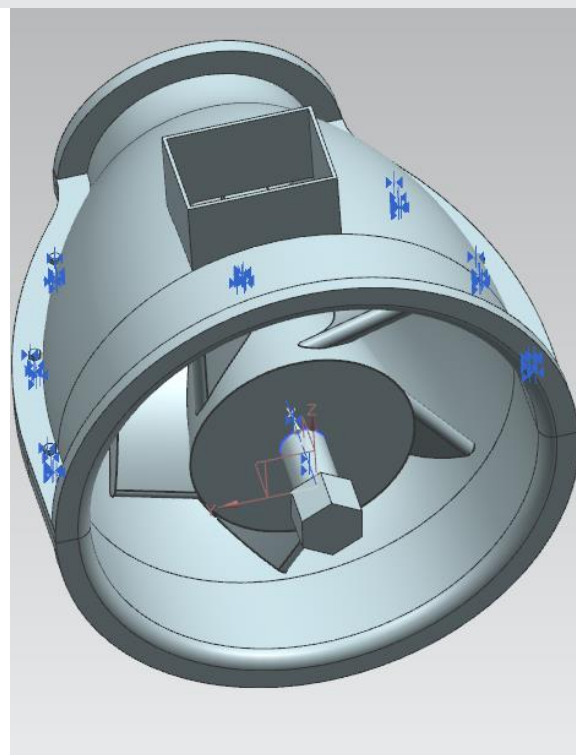
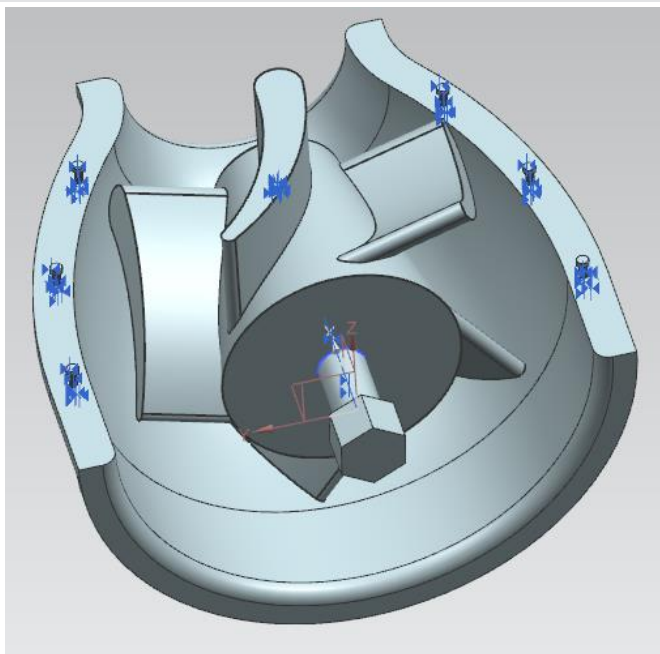
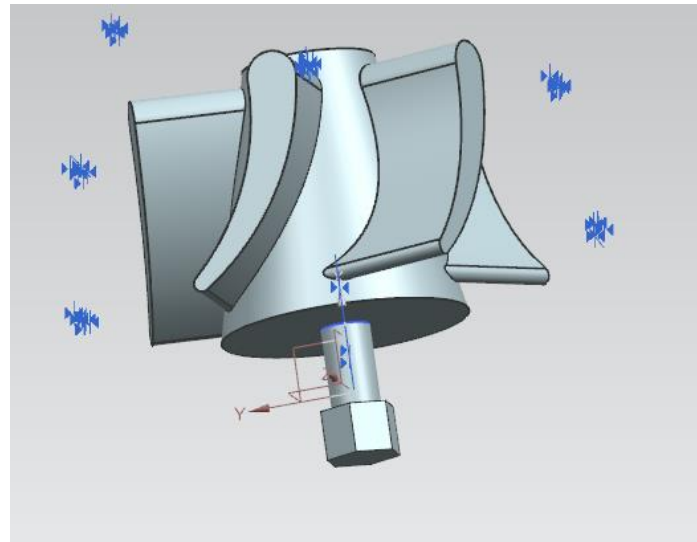
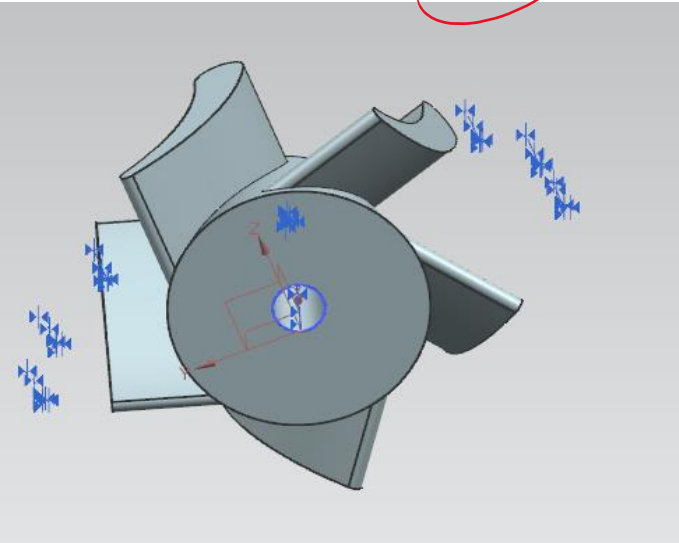
Student: Will C. Walker III

160 / 200

Description: The Impeller assembly is a conceptual design for a mechanism that is to translate water flow into axle rotation which could then be used to drive another device. Below is an illustration of the Impeller assembly that you will model.

3D NX Models of Individual Components:

not showing many components.



Some dimensions off

Missing some constraints

Bolt, Nut, and Washer Selection

- Bolt = Normal Size, in $\frac{1}{2}$ Square $W=3/4$ $H=21/64$
Regular Hexagonal $W=3/4$ $H=11/32$ $R_{min}=0.01$
- Nut = Normal Size, in $\frac{1}{2}$ Width= $3/4$ Regular hexagonal $7/16$
- Washer = Faster Size $\frac{1}{2}$ N Washer Size=.500 ID=.531 OD=1.062
Thickness=0.095

The way you will assemble all the pieces together is that you go to assibilates bar at the top of the screen then press the tab that says add and there it will show all of your other pieces then you will simply add then all together.

too general

Conclusion:

In conclusion this project was one of the hardest ones I've ever had to genuinely do. From sleepless nights and continues headaches I can truly say it was all worth it.