

# ITP 308: Homework 6

Due: March 3, 2021 11:59pm

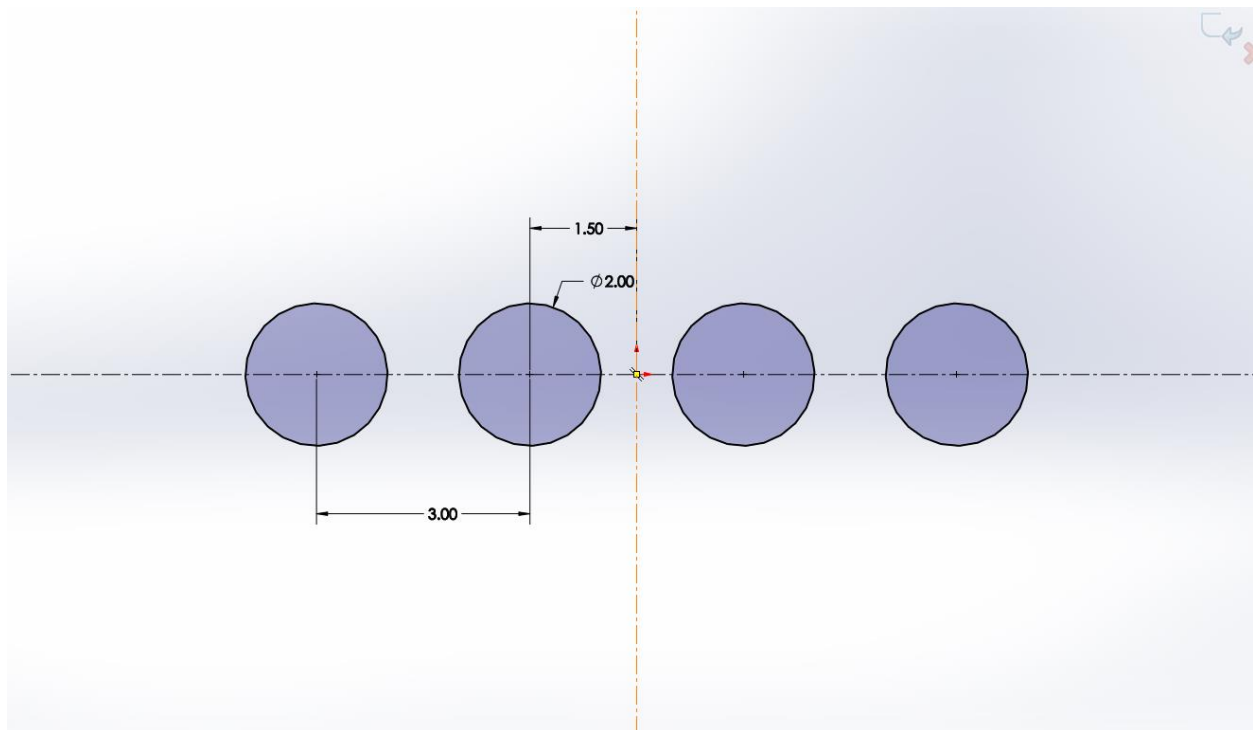
## Setup

This assignment will use 3D sketches and lofts to create an exhaust manifold for a car's engine. An exhaust manifold is a series of pipes that allows for the exhaust from the cylinders to escape and flow out of the engine block into a downpipe, through a catalytic converter, and finally out through the muffler and tailpipe.

You will only be required to build the exhaust manifold (the part that bolts to the engine). The requirements for the manifold are given below.

## Requirements

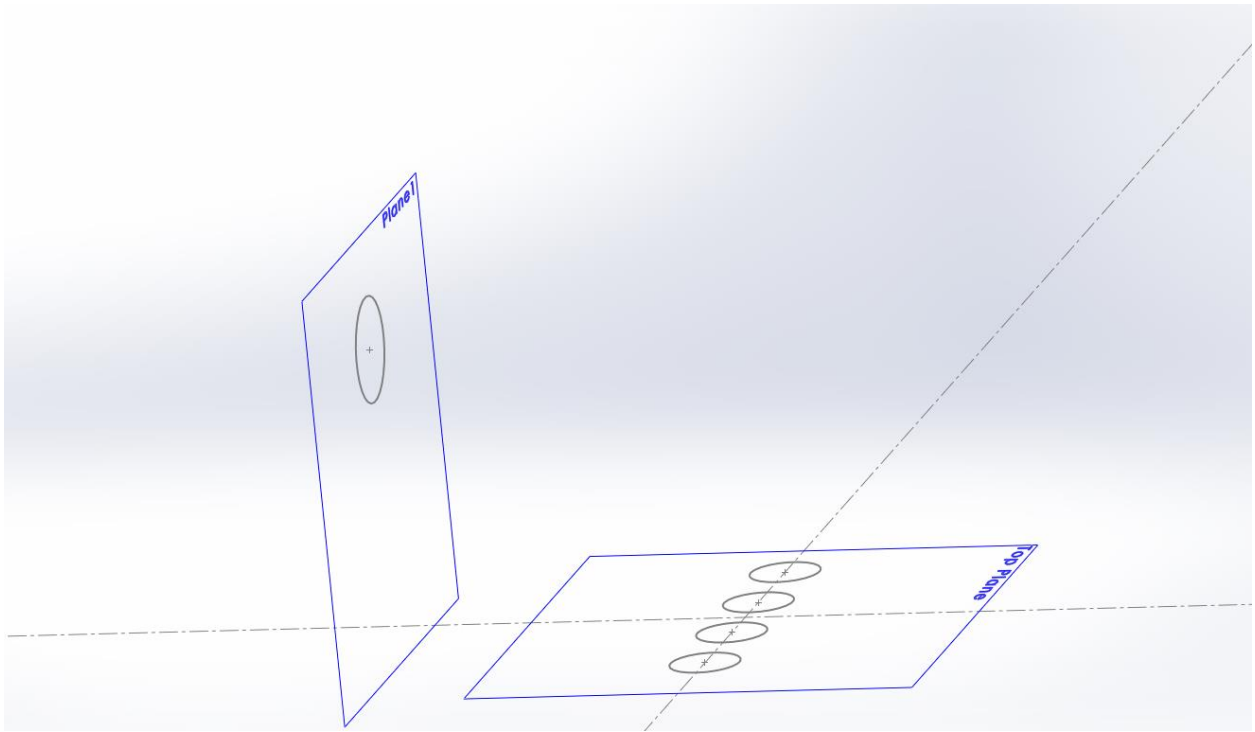
The first requirement is that there must be four (4) inlet ports and one (1) outlet port. The engine block has 4 cylinders on either side. Each cylinder has an exhaust port that feeds into the exhaust manifold. The exhaust ports are spaced evenly apart, therefore the exhaust manifold's inlet port should match up to these exhaust ports. The dimensions of the ports are given in the following sketch:



All dimensions are given in inches. The holes represent the OUTSIDE diameter of the pipes that need to connect to these ports. The pipes should have a thickness of 0.10 inches.

The outlet port of the manifold should have an outer diameter of 3.00 inches.

The inlet and outlet ports should be oriented as follows:



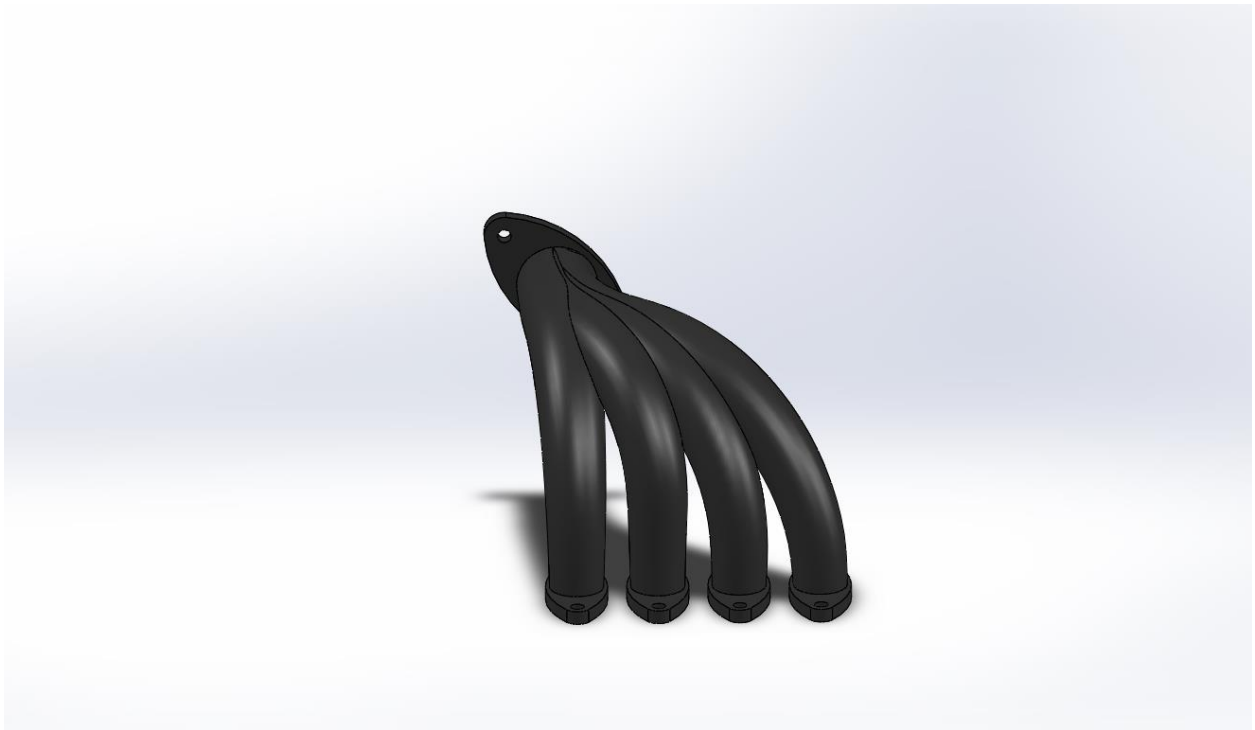
The Top Plane and Plane 1 are orthogonal. Plane 1 is parallel to the front plane and is 10.00 inches away.

The center point of the outlet port (the larger circle) is 8.00 inches above the Top Plane.

Your final manifold can be symmetrical or asymmetrical. Examples of both are given below:

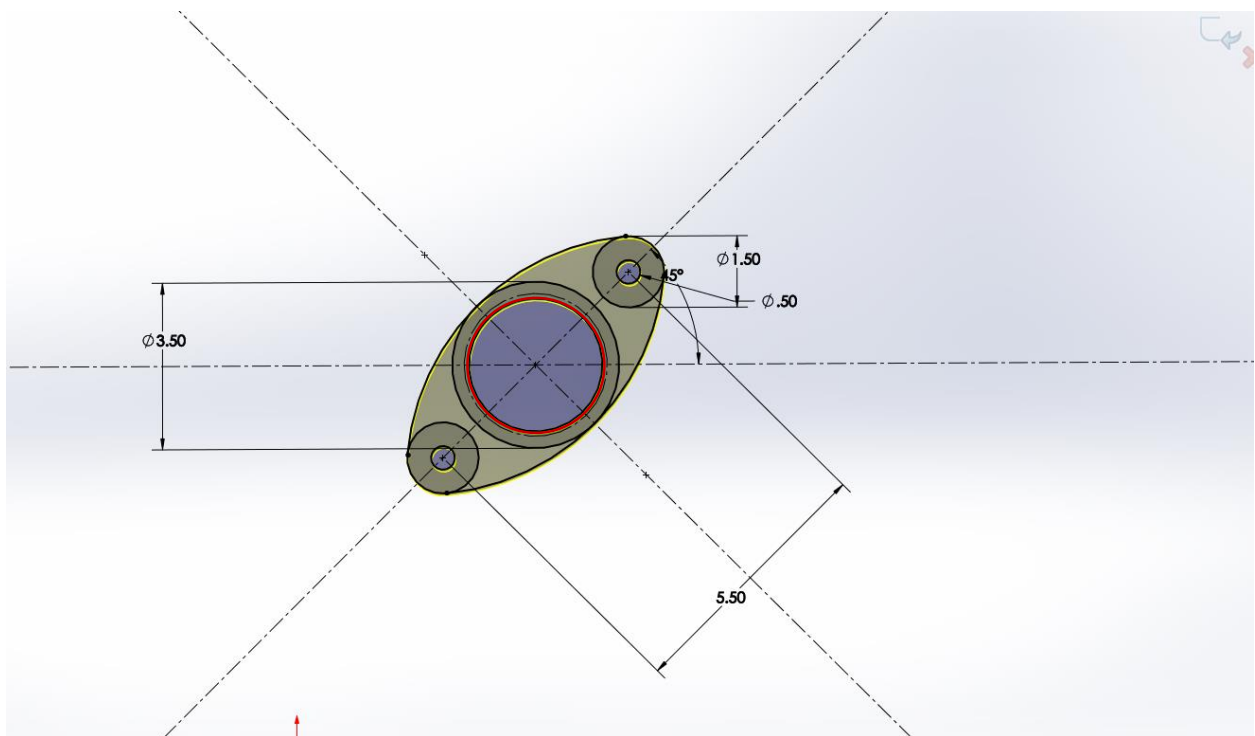


This manifold is symmetrical.

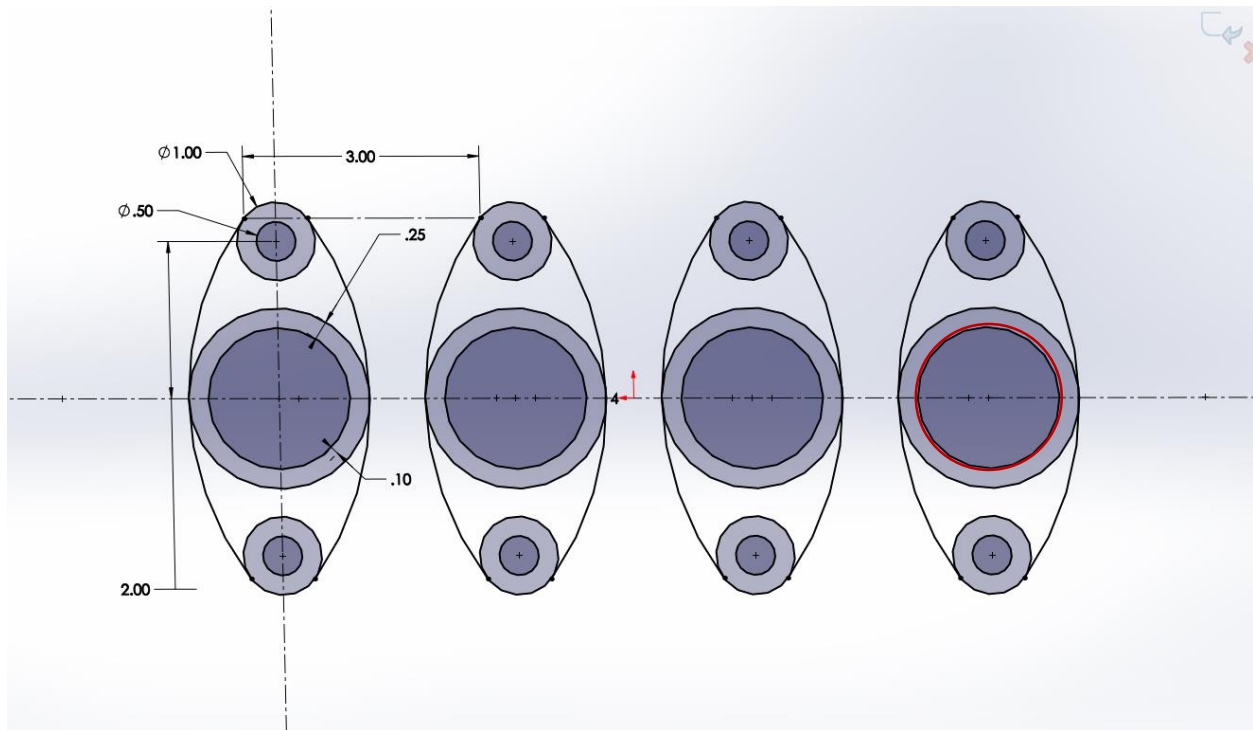


This manifold is asymmetrical.

The mounting plates (the places where the bolts will go) have the following profiles:



This is the mounting plate for the outlet port of the manifold (the large diameter circle). The circle marked in RED indicates the inner diameter of the pipe.



This is the mounting plate for the inlet ports of the manifold (the small diameter circles). The inner circle outlined in RED indicates the inner diameter of the pipe.

The manifold should be designed so that there are no sharp corners. It must be designed so that the tubes are uniform thickness throughout. All four (4) inlet ports should join to the same outlet port in a smooth manner.

## Material Selection

Exhaust manifolds are made of one of two materials: Stainless Steel, or Cast Iron. You may choose from one of these two categories for your part.

## Grading

Description	Points
Correct inlet and outlet port locations	5
No sharp corners present	5
Uniform thickness throughout	5
Inlet port mounting plates	5
Outlet port mounting plate correct	5
Correct material selection	2
<b>Total</b>	<b>22 points</b>

## Deliverables

Create your part file and name it:

**manifold.sldprt**

Compress into a single zip file and name it:

***username\_hw6.zip***

Where *username* is your USC username.