

# LINDEN ROBOTICS

FRC-3568 Linden RoboEagles

FTC-7031 Linden Battle Blazers

# Autodesk Fusion 360 Training



**We need to thank our FIRST sponsor -**



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FUSION 360<sup>™</sup>**



**AUTOCAD<sup>®</sup>**

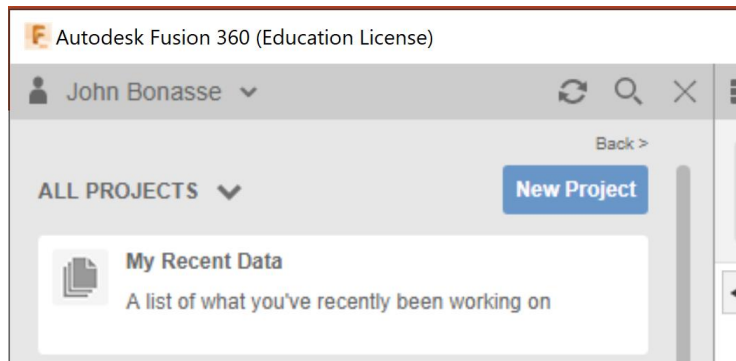
You should have already downloaded and installed Fusion 360. If you haven't please see the email previously sent with details.

Open the software. You may be prompted to sign into Autodesk.

Click on New Project and name it RoboEagles.



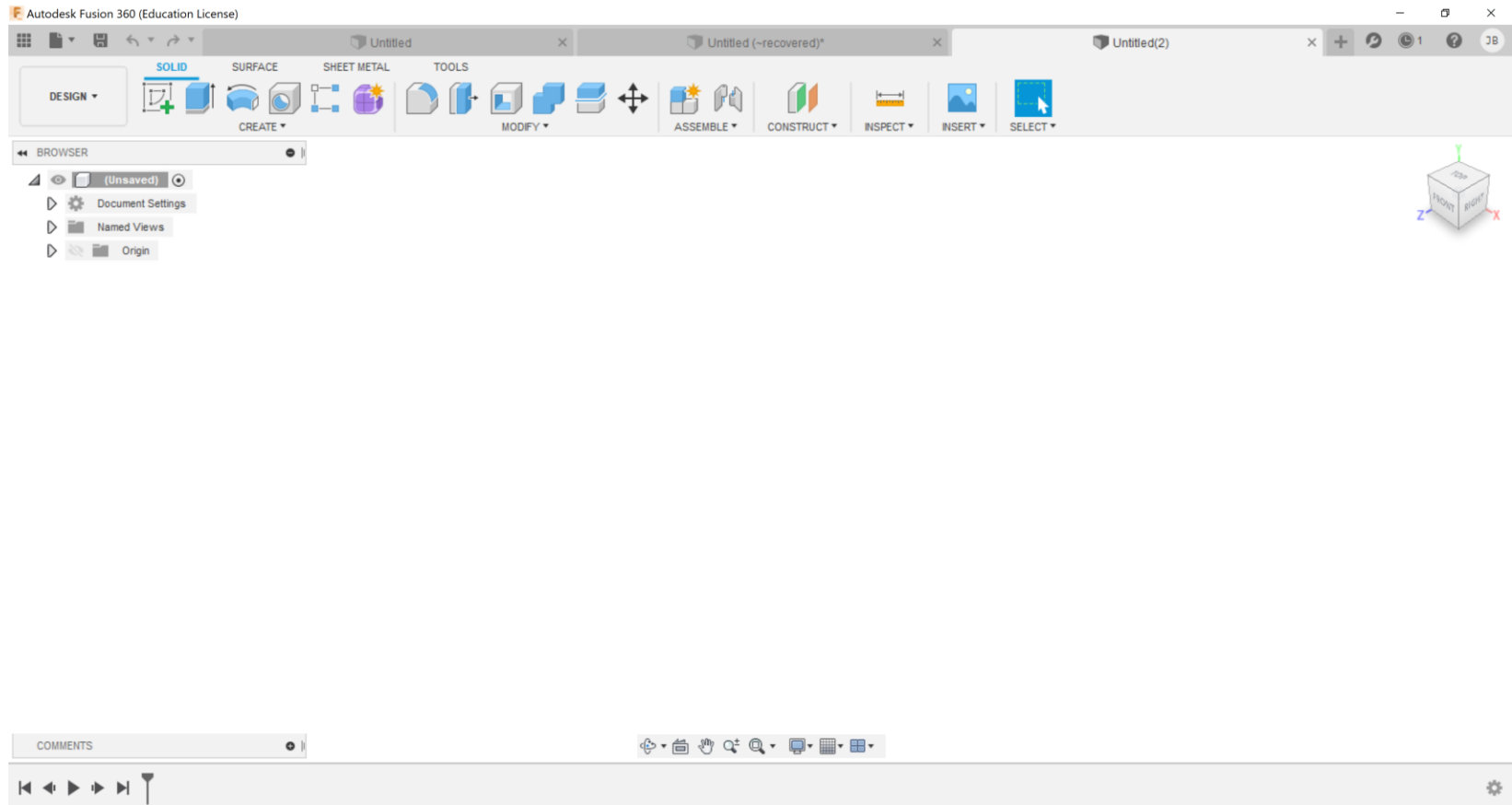
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Your screen should look similar to the one shown below.





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## Let's draw our first SKETCH

- 1 – Click on **Create**.
- 2 – Choose **Create Sketch**.

The screenshot shows the Autodesk Fusion 360 software interface. The top ribbon has tabs for SOLID, SURFACE, SHEET METAL, and TOOLS. The 'CREATE' dropdown menu is open, showing options like New Component, Create Sketch, Create Form, Derive, Extrude, Revolve, Sweep, Loft, Rib, Web, Emboss, Hole, Thread, Box, Cylinder, Sphere, Torus, Coil, and Pine. The 'Create Sketch' option is highlighted. To the right, a 2D sketch of a part is shown on a grid. The sketch is a rectangular shape with a semi-circular cutout on the right side. Dimensions are provided: 100.00 for the width, 120.00 for the height, 45.00 for the distance from the left edge to the start of the semi-circle, and R55.00 for the radius of the semi-circle. A text box on the right explains the sketching process.

Use Sketch mode to create basic geometry profiles that define the design. First select a construction plane. Then create lines, arcs, or points and use dimensions to constrain the boundaries. Sketches are used with 3D creation commands such as Extrude.

After creating the boundary, select Finish Sketch to exit Sketch mode.

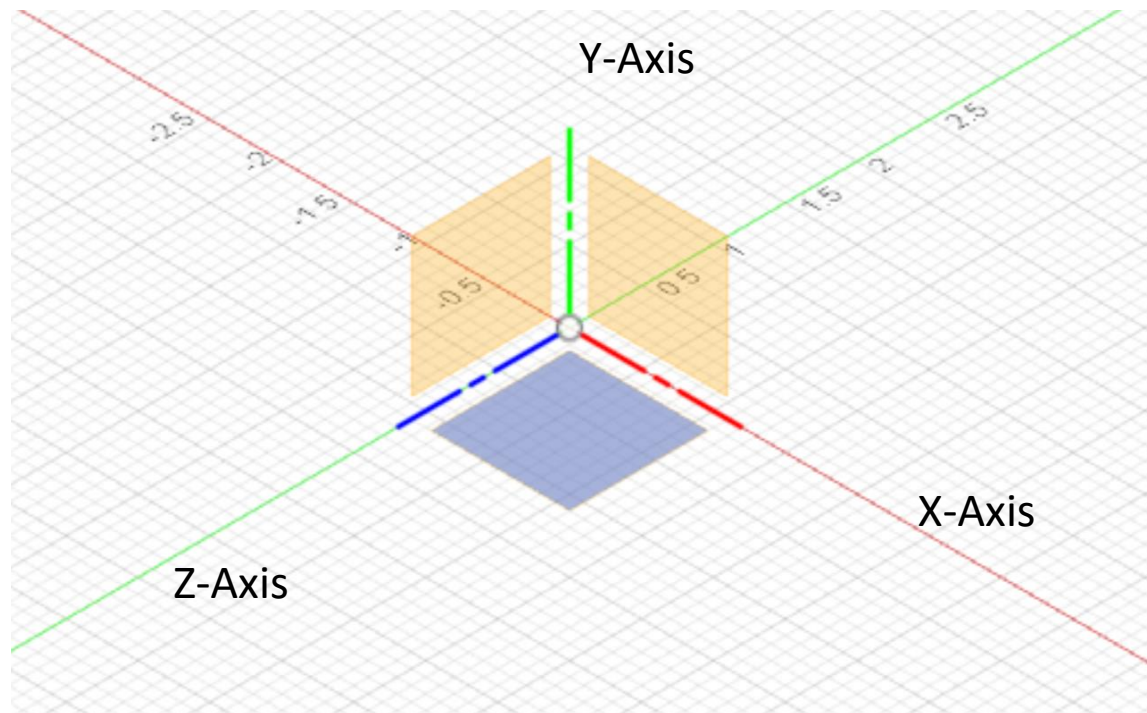


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Let's draw our first SKETCH

There are 3 drawing planes – X, Y, & Z.

3 – Choose the XZ Plane by clicking on the box.



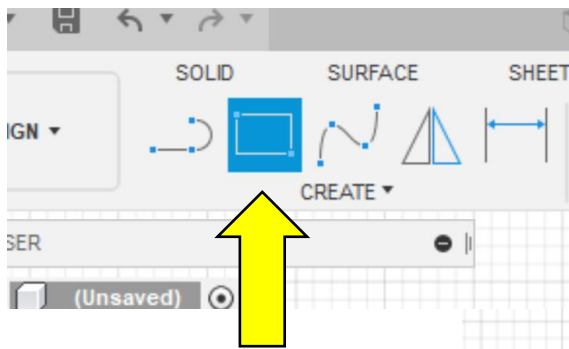


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## Let's draw our first SKETCH

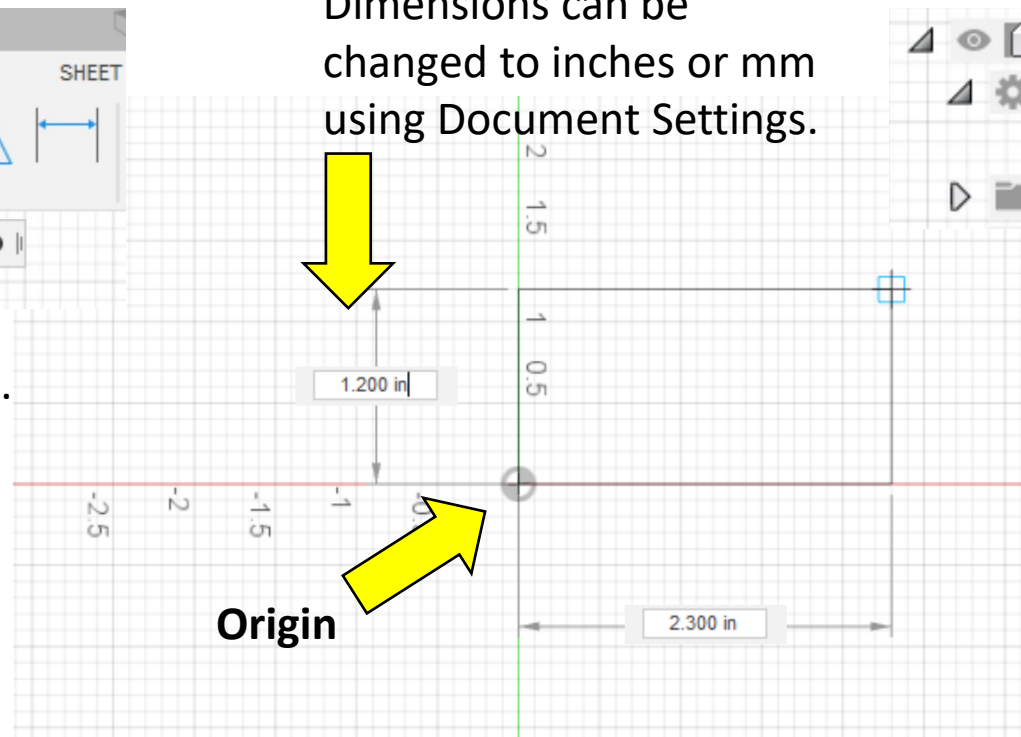
The drawing should spin to show the XZ plane looking down from above it.

4 – Draw a 2.5" X 2.5" rectangle with the bottom left corner at the origin.



Select the **Rectangle Tool**.

Dimensions can be changed to inches or mm using Document Settings.

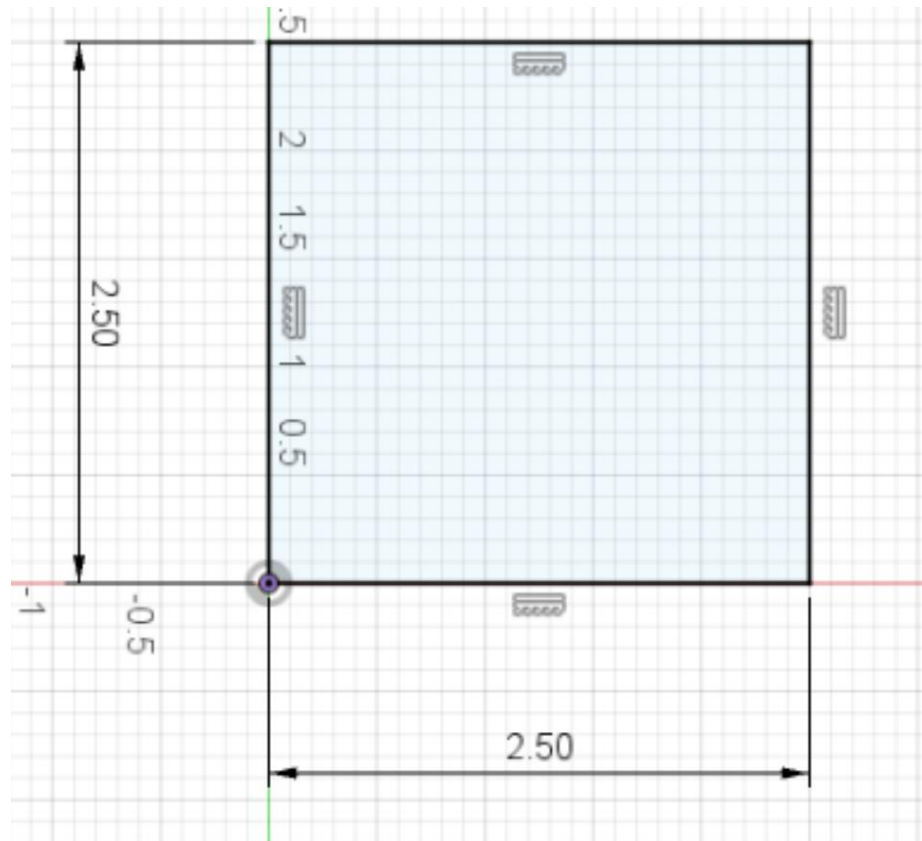




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## Let's draw our first SKETCH

5 – Type **2.50** in the dimension box and press the **Tab** key, type **2.50** again in the other dimension box and press **Enter**.



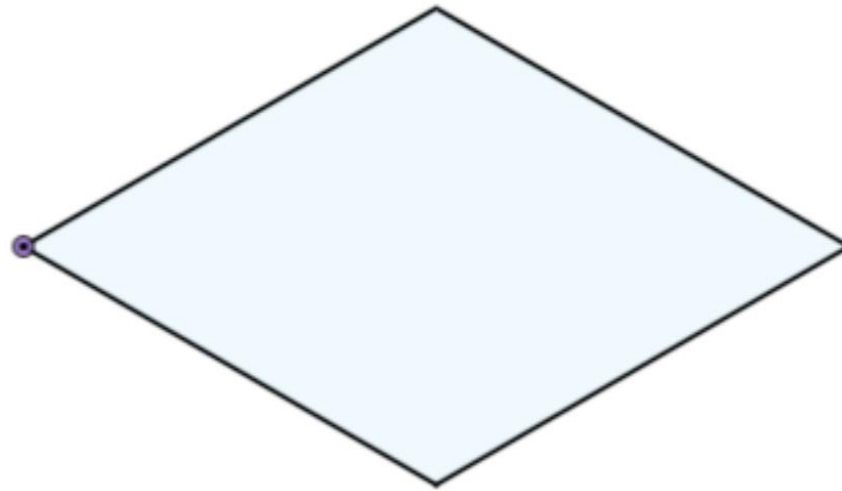
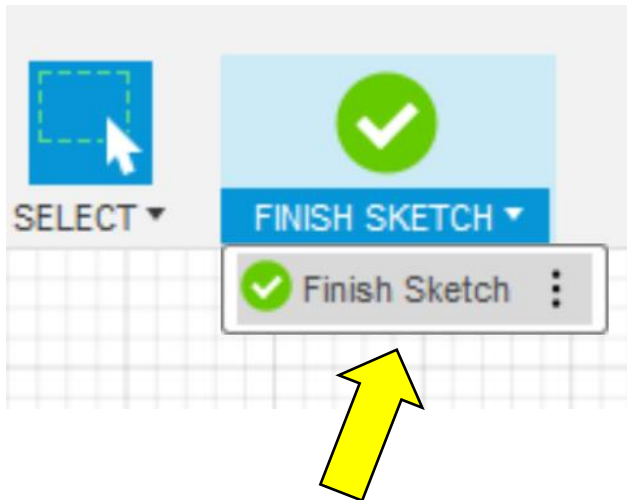




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## Let's draw our first SKETCH

6 – Select **Finish Sketch** from the **Menu Bar**. The image should spin back to the XYZ Planes as shown.



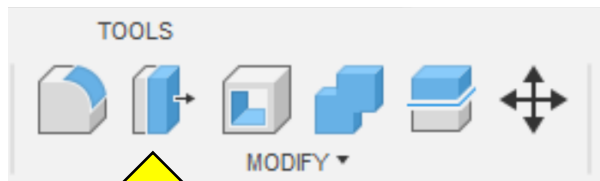


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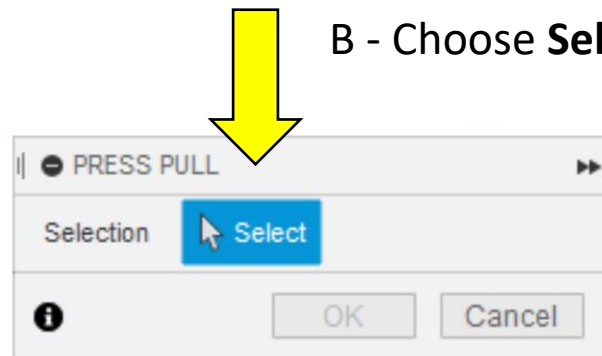
Let's draw our first SKETCH

Let's give the Square thickness.

7 – Choose **Press Pull**, click on **Select**, and choose the Square.

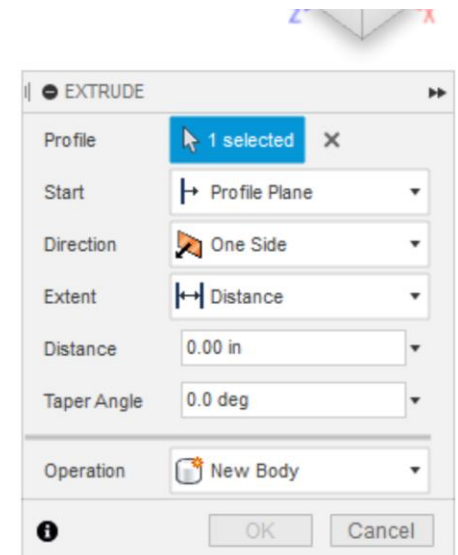
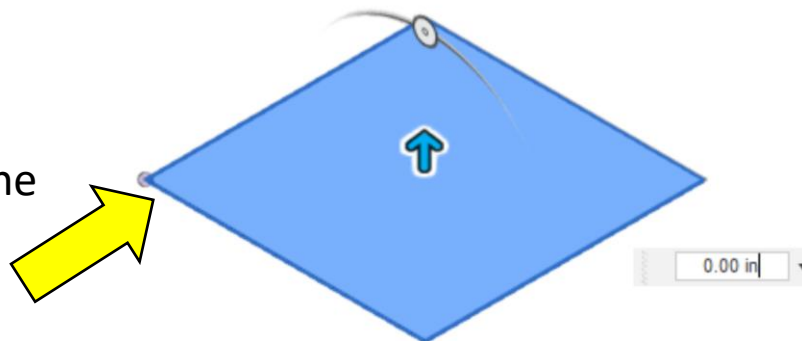


A - Select the **Press Pull Tool**.



B - Choose **Select**.

C - Click on the  
Square.



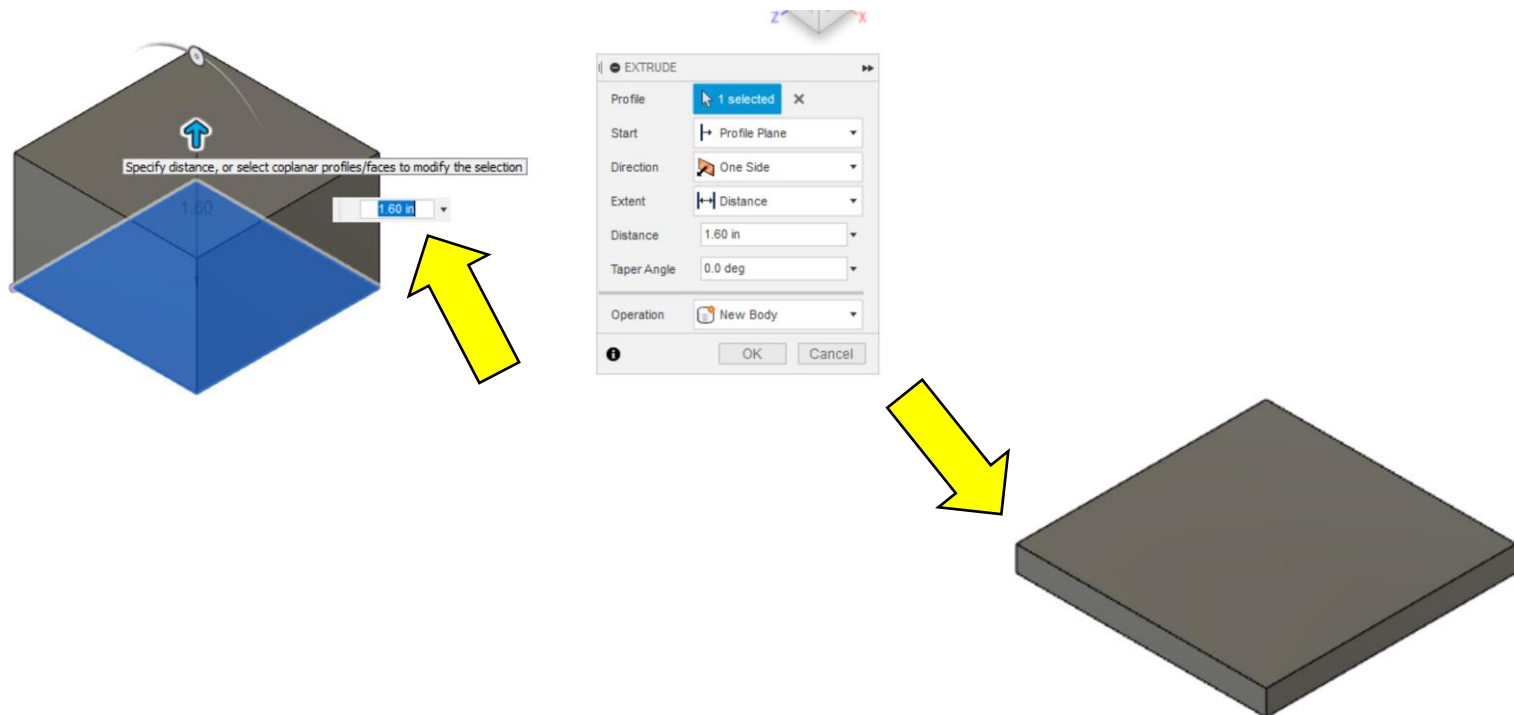


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## Let's draw our first SKETCH

Let's give the Square thickness.

7 – Grab the arrow and **Pull** upwards. You can now type in a thickness of 0.25 in and press **Enter**. You'll see a solid square with ¼" thickness.



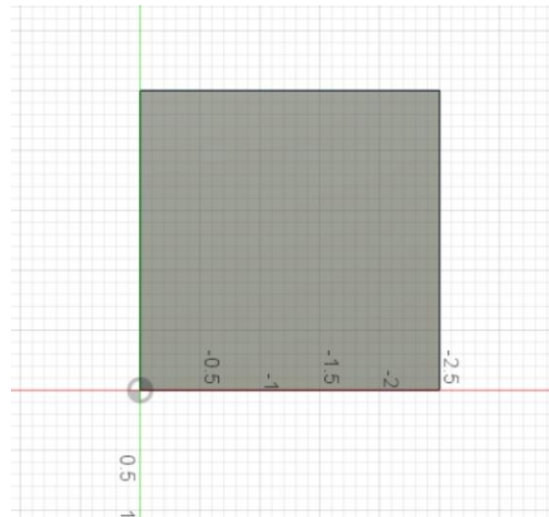
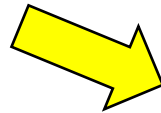
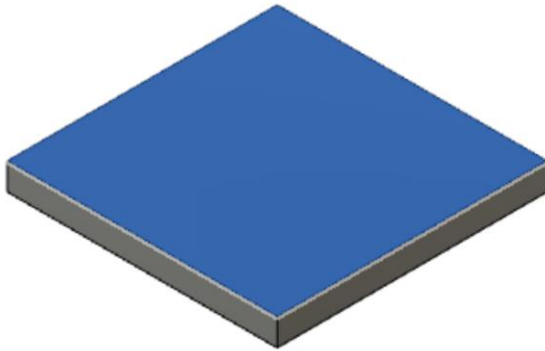


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## Let's draw our first SKETCH

Let's add 2 holes.

8 – Create a new **Sketch** and select the top surface of the square by clicking on it. It will highlight to indicate it's selected. The drawing will spin so that you're looking down on the surface.



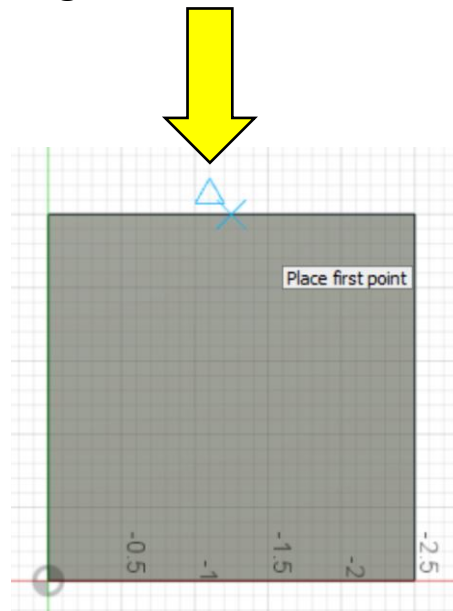
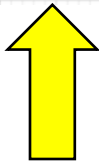
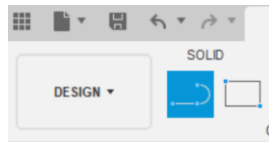


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## Let's draw our first SKETCH

Let's add 2 holes.

9 – Lets add **Construction Lines** to locate the two holes we're adding. Select the **Line Tool**. Drag the cursor across the top of the square until you see a **Triangle** (indicates the center). Click and drag it to the bottom edge keeping it at 90 degrees. Click again to end drawing the Line.



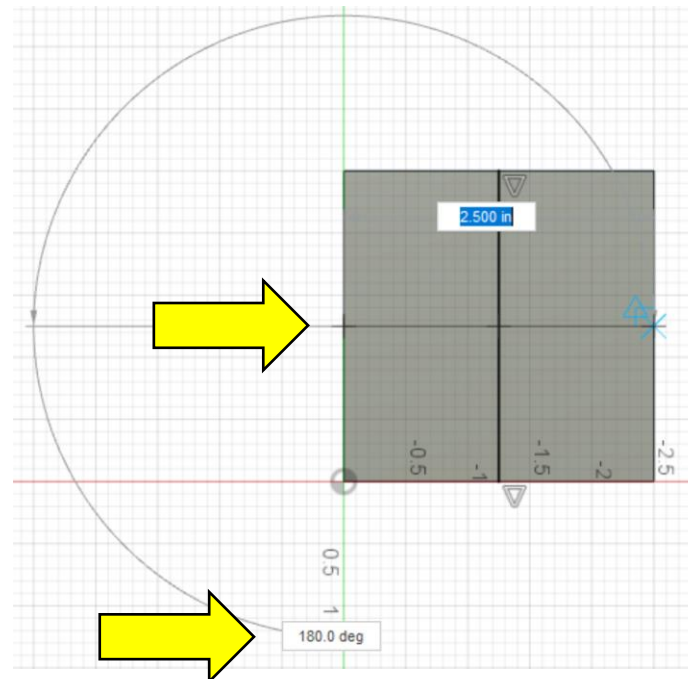


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## Let's draw our first SKETCH

Let's add 2 holes.

10 – Add another horizontal **Construction Line** to locate the two holes we're adding. The **Line Tool** should still be active. Drag the cursor across the side of the square until you see a triangle (indicates the center). Click and drag it to the opposite edge keeping it at 180 degrees. Click again to end drawing the Line.



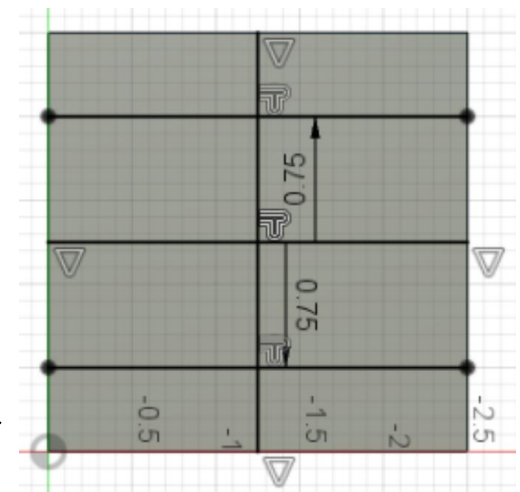
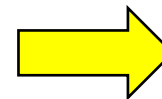
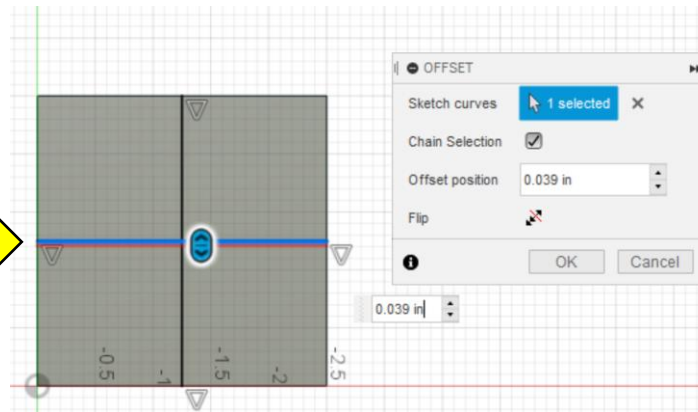
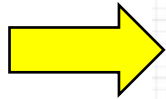
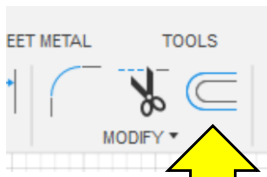


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## Let's draw our first SKETCH

Let's add 2 holes.

11 – We now need to offset the line above and below the centerline. Select the **Offset Tool** or press **O**. Click on the horizontal line and type in 0.75 in. The line will jump down (or up depending on axis) and press **Enter**. Repeat and enter -0.75 in.



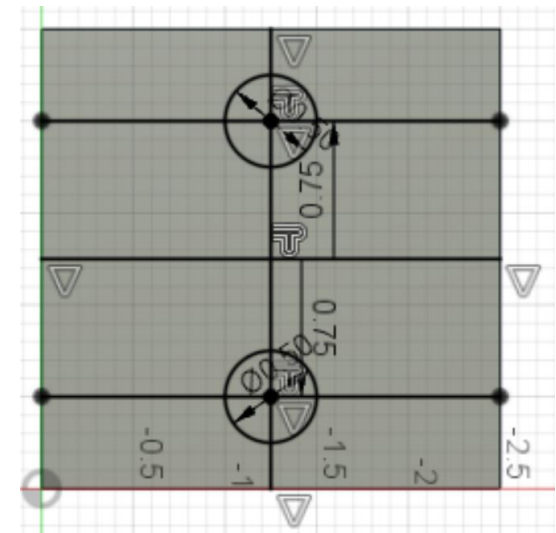
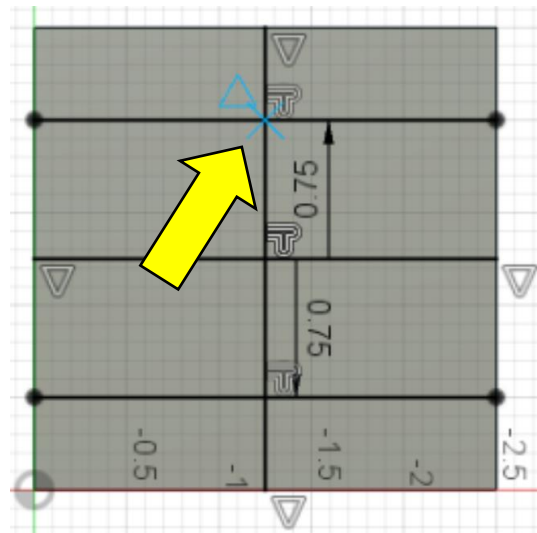
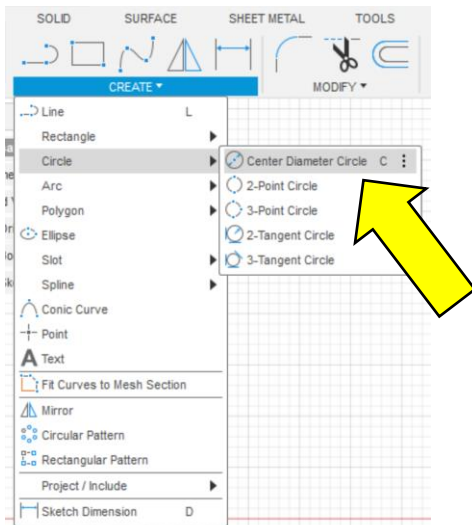


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## Let's draw our first SKETCH

Let's add 2 holes.

12 – We now have **Center Points** for our holes. Draw two circles by using the **Center Diameter Circle Tool**. Select it and click on a **Center Point** we created. Drag the circle out and enter **0.50** in for the diameter. Repeat on the second center point.





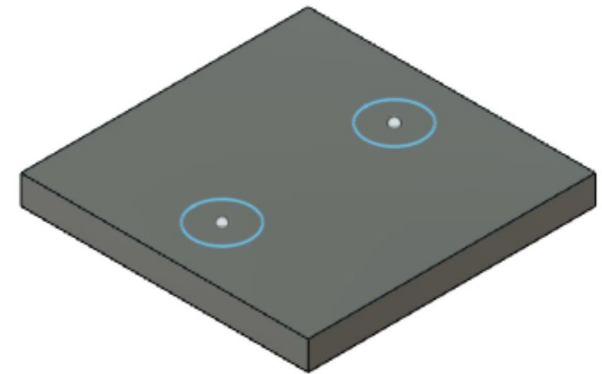
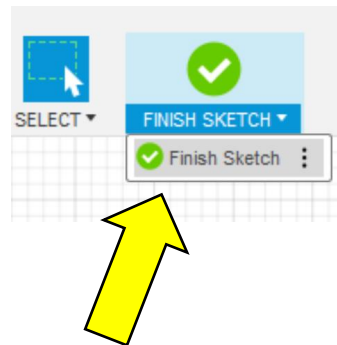
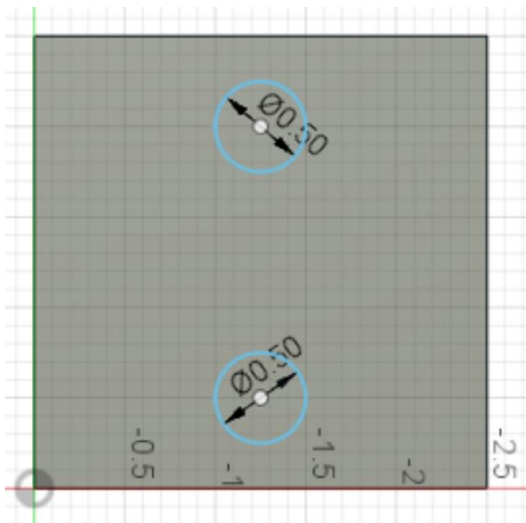


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Let's draw our first SKETCH

Let's add 2 holes.

13 – Delete the **Construction Lines** we created and finish the sketch. Click on each Line and press **Delete**. When done click on **Finish Sketch**.



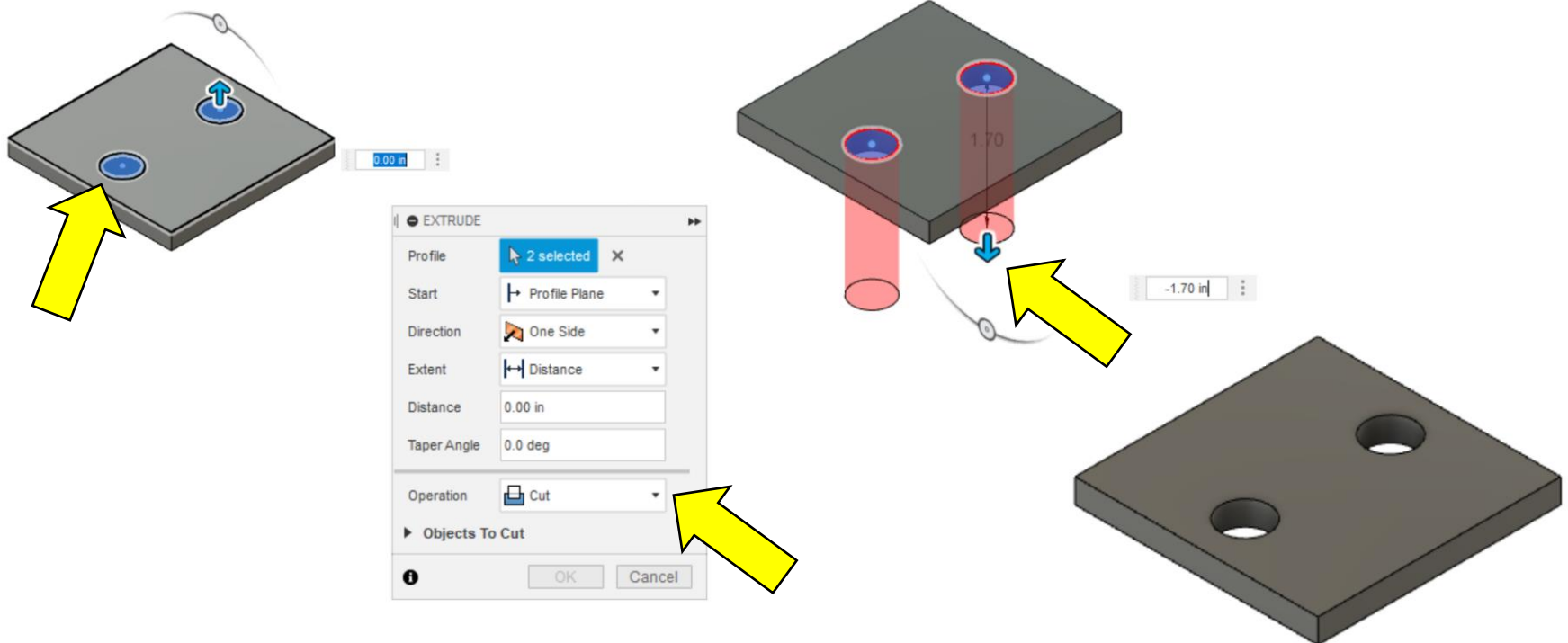


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## Let's draw our first SKETCH

Let's add 2 holes.

14 – We can now **Press Pull** the circles through the part. Select both circles by holding the **Shift** key while clicking on them. Change the **Operation** to **Cut** and grab the arrow and drag the circles through the part. Press **Enter** and the holes will appear.



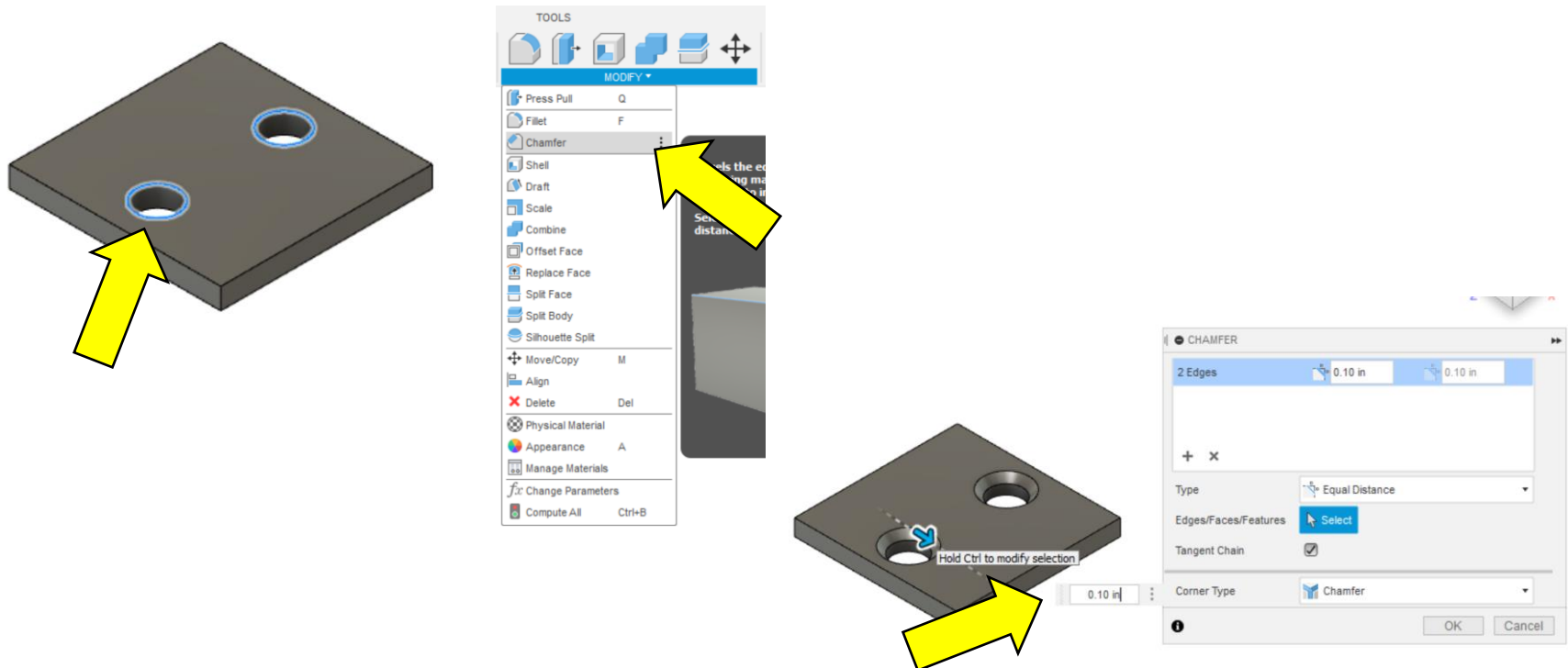


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## Let's draw our first SKETCH

Let's add a chamfer to the hole edges.

15 – Select both holes using the **Shift** key. Select the **Chamfer Tool** from the **Modify Menu**. Drag the arrow or type 0.10 in and press **Enter**.



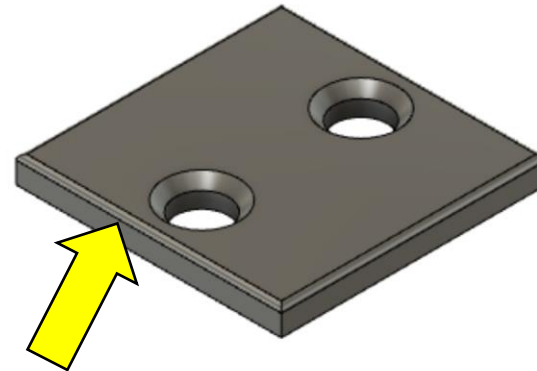
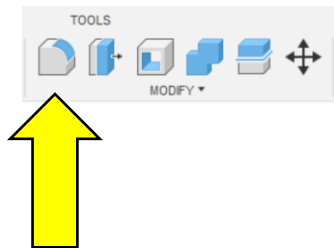


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## Let's draw our first SKETCH

Let's add a fillet to the edges of the part for safety.

16 – Select all four top edges using the **Shift** key. Select the **Fillet Tool** from the **Modify Menu**. Drag the arrow or type **0.05** in and press **Enter**.



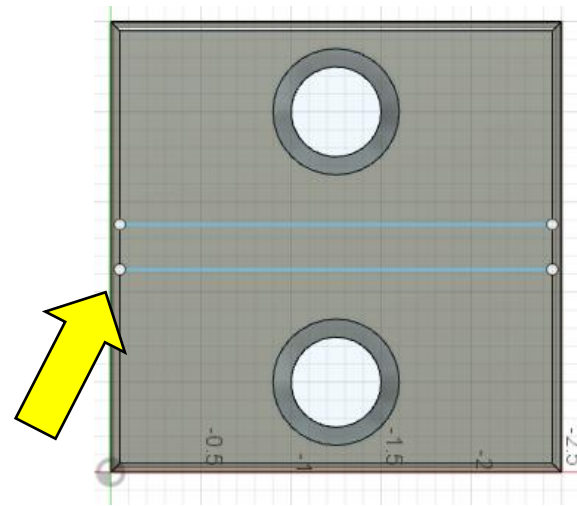
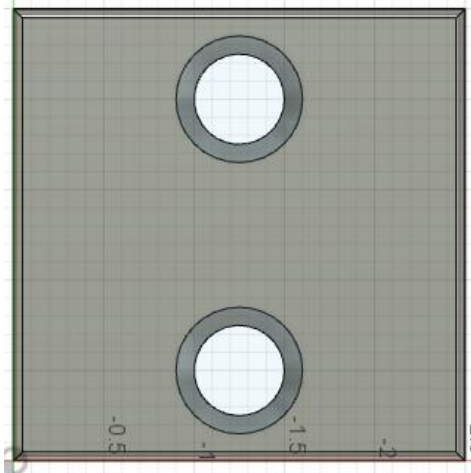


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## Let's draw our first SKETCH

Let's add a mount to the bracket.

17 – Create a new sketch and choose the top surface of the part. The drawing should spin and you should be looking down onto the surface. Add a **Construction Line** through the center of the part and offset it in both directions by **0.125 in**. Delete the **Construction Line** and **Finish Sketch**.



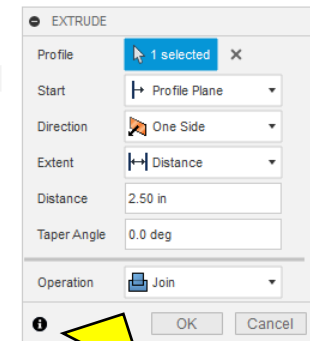
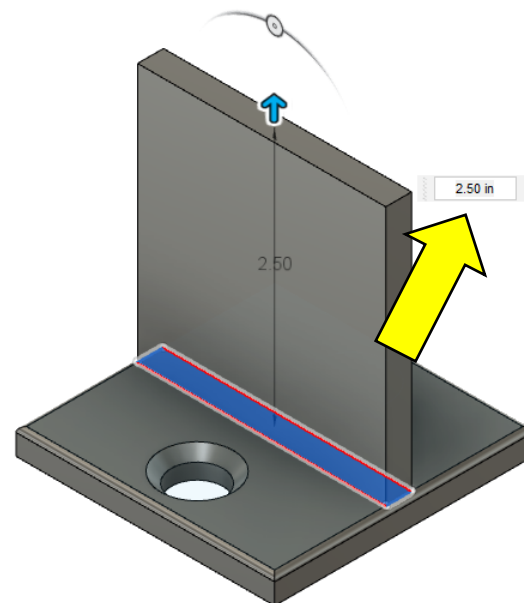
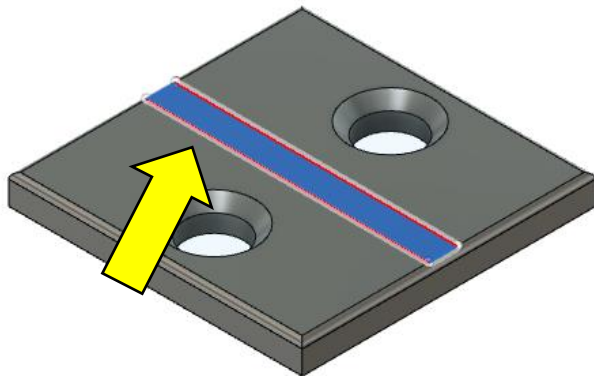


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## Let's draw our first SKETCH

Let's add a mount to the bracket.

18 – Pull the surface you created out of the part. To do this select the rectangle contained between the two lines. Select the **Press Pull Tool** and drag the surface or type in **2.50 in**. Make sure the **Operation Type** is set to **Join**.



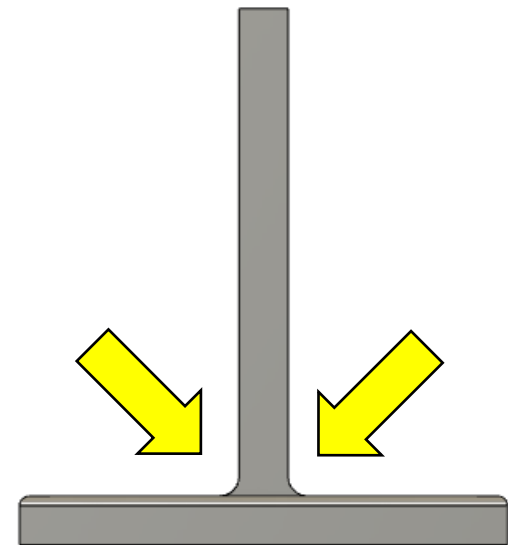
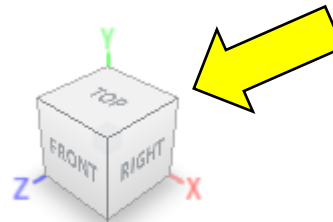
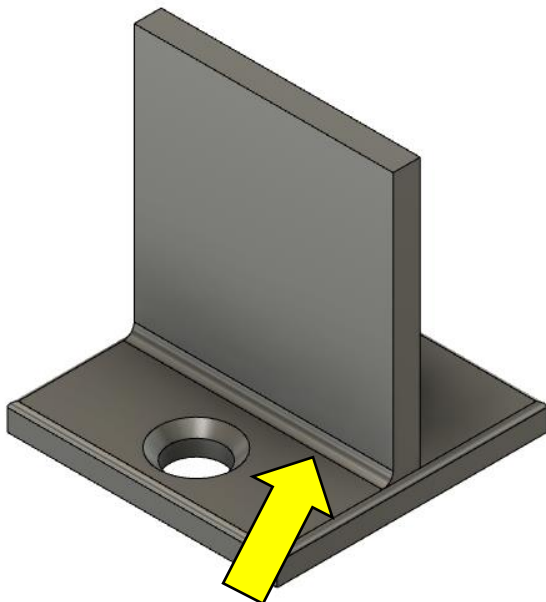
## Let's draw our first SKETCH

Let's add a mount to the bracket.

19 – Add a fillet to the inside edges of the new bracket. Select the edge and **Fillet Tool** and create a **0.10** in fillet. To get access to the back edge you can use the **View Tool** in the upper right corner of the screen. Your current view is shown by the darkened corner (Front Right in this case). Select the corner to the right and the drawing should rotate. Add a fillet to the other edge.



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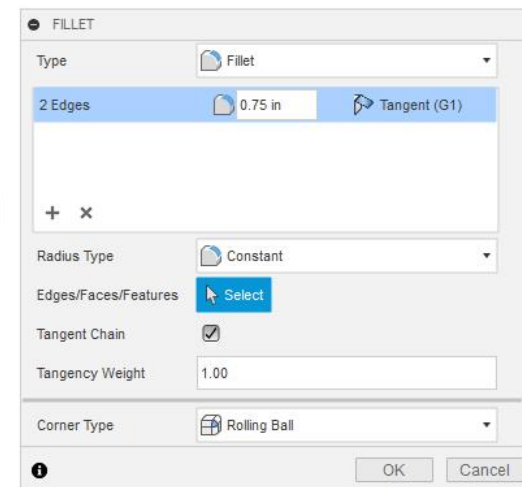
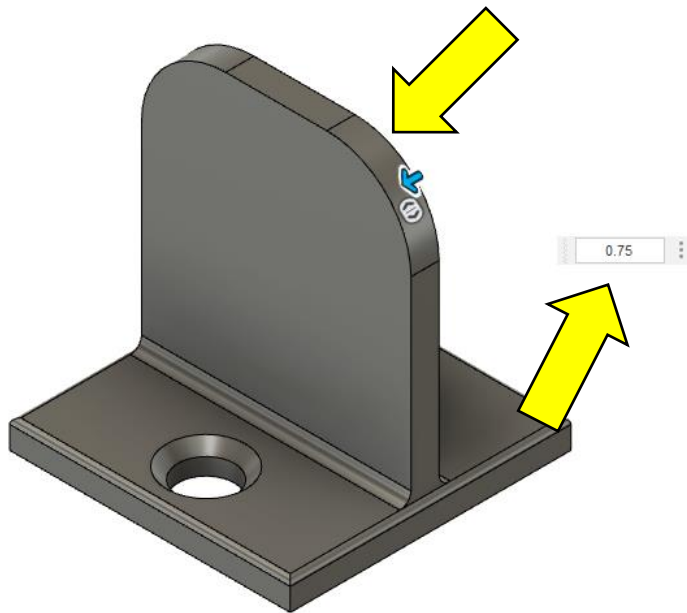


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## Let's draw our first SKETCH

Let's add a mount to the bracket.

20 – Now fillet the corners and add a hole in the center. Select both top corners and choose the **Fillet Tool**. Drag the arrow or type in **0.75** in.





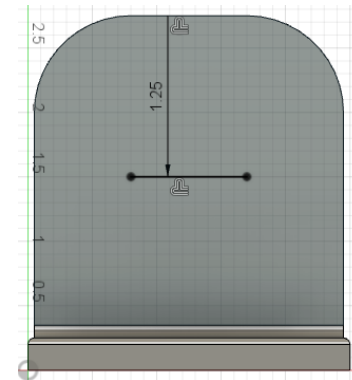
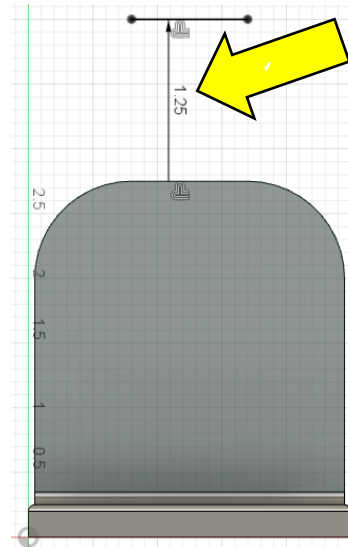
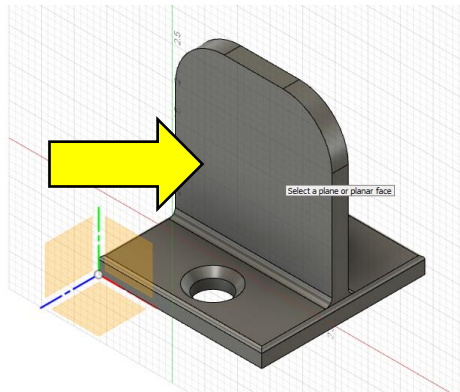


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## Let's draw our first SKETCH

Let's add a mount to the bracket.

21 – To add the hole create a **Sketch** on the surface of the bracket. Draw **Construction Lines 1.25** in down from the top and on center. Notice below my line went in the wrong direction. To fix this just double click on the 1.25" dimension and add a negative sign at the left of the number.



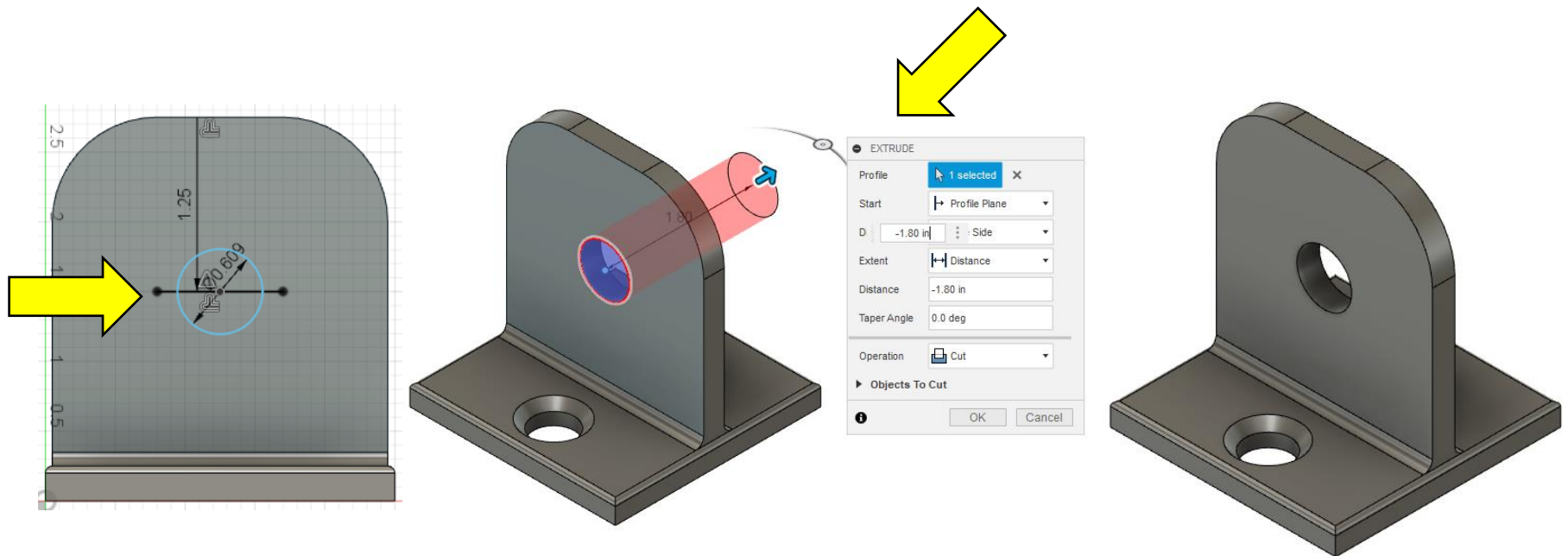


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## Let's draw our first SKETCH

Let's add a mount to the bracket.

22 – Add the circles using the **Center Diameter Circle Tool**. Draw the circle at the mid-point of the offset line shown by the triangle ( $39/64'' = 0.609''$ ). **Finish Sketch** and **Press Pull** the circle through the part.



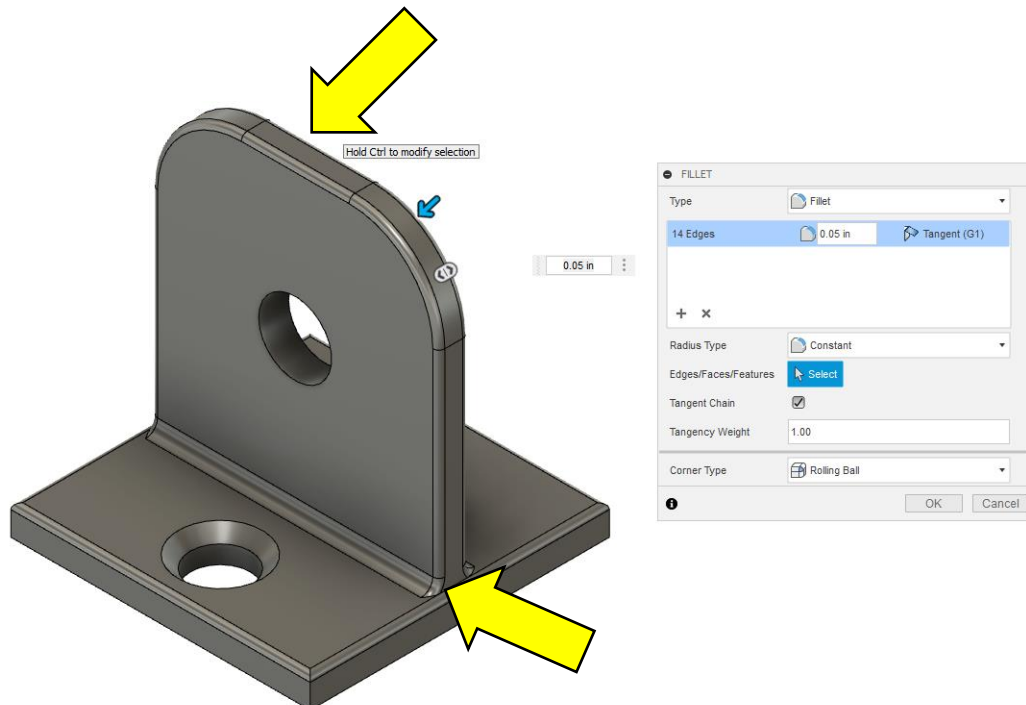


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## Let's draw our first SKETCH

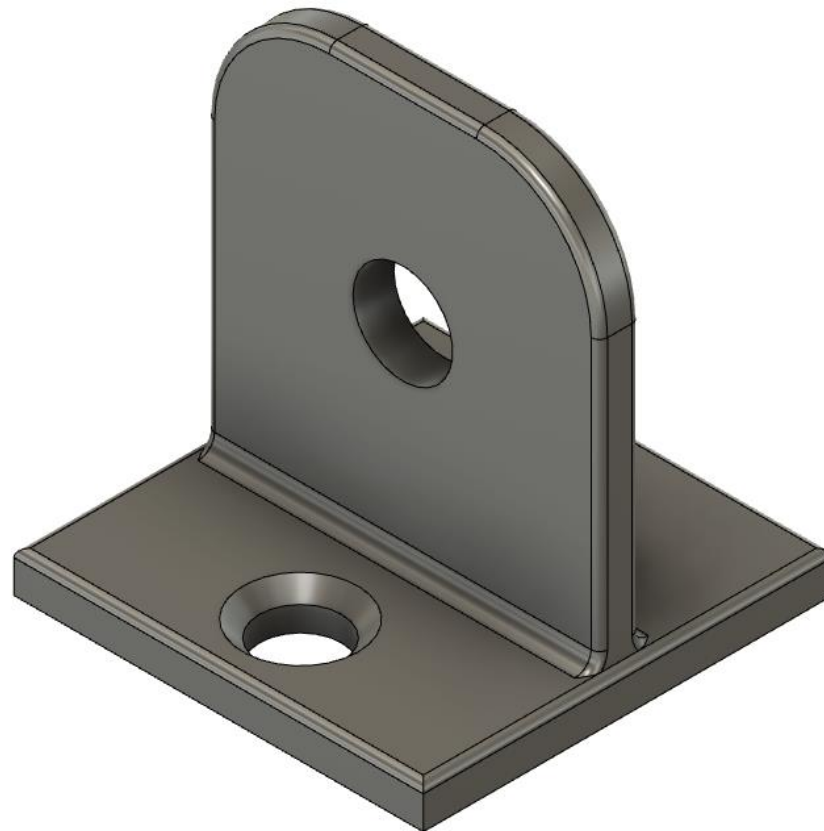
Let's add a mount to the bracket.

23 – Now add a **0.05** in fillet to the edges. To get to the small edges on the lower fillets you may need to **Zoom** in. You can do this using the **Scroll Wheel** on the mouse. Backwards zooms in and forwards pans out.



Let's draw our first SKETCH

Next meeting we will make a new **Component** and add a **Pivot** for motion.



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