

## Activity 1.5.4 Sketch Plane Cube

### Introduction

Have you ever tried to explain to someone what you knew, and that person wanted you to tell him or her more? Here is your chance to do just that. You have been learning about three-dimensional (3D) modeling. Using your sketching, your visual, and your computer skills, you will create a 3D object following specified criteria and constraints.

### Equipment

- PLTW Gateway notebook
- Pencil
- Computer with 3D modeling software

### Procedure

You have been hired by the Do Right Box Company. The company president, Ms. Open Ender, has a new idea for a box that he would like you to re-create. The box is a 2 inch cube.

Ms. Open Ender has provided sketches to give you an idea of what he would like. He has included the criteria and constraints. “It is important that the dimensions are exact and that your final solution looks like my final sketch,” says Ms. Open Ender as you eagerly take your assignment to your desk.

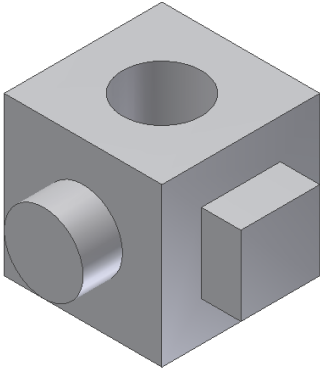
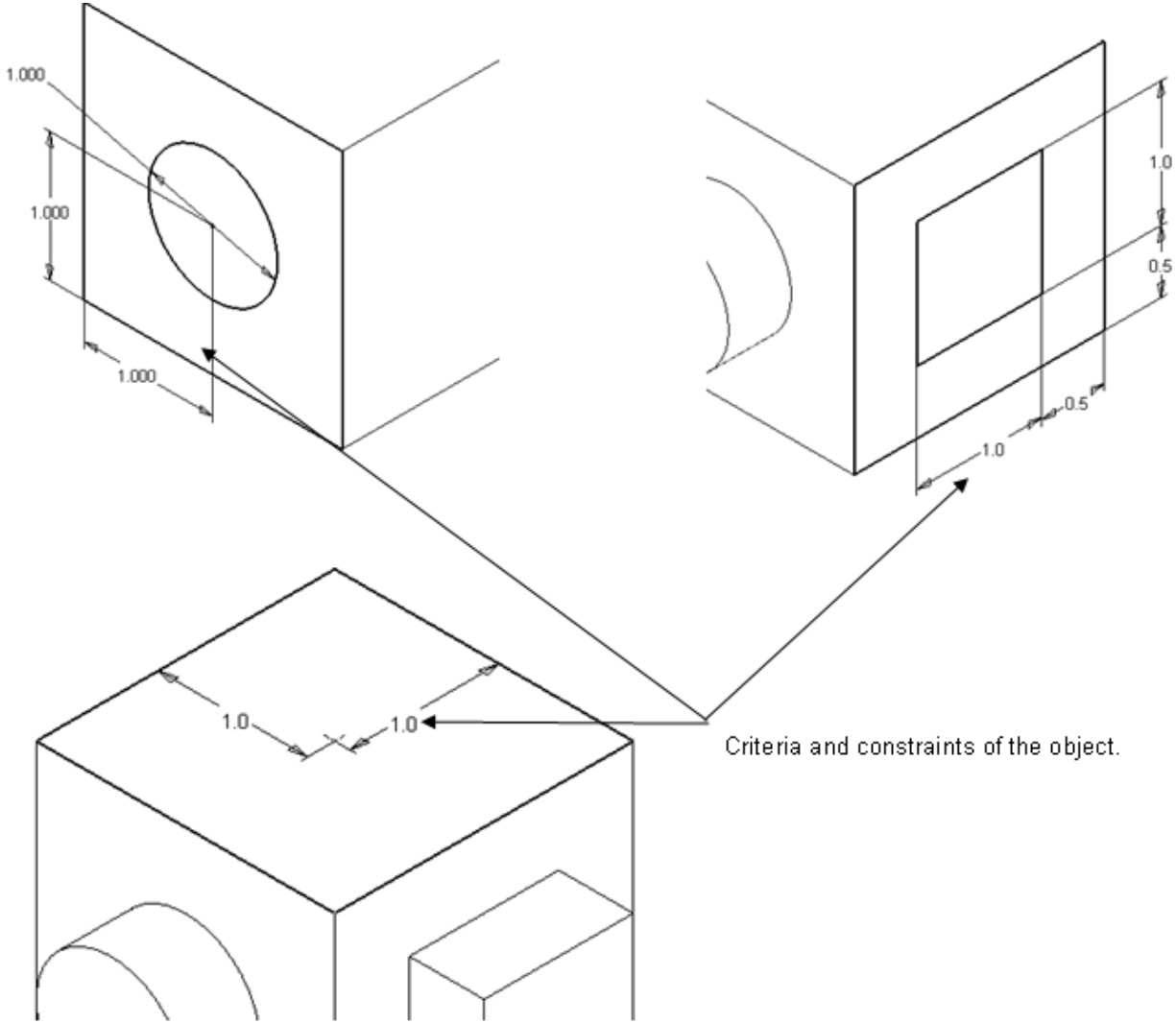
Ms. Open Ender continues, “One more thing. You may want to try sketching this box by hand to understand what I want before you move to using the computer.”

“After you have created my box on the computer, save the file and print it to be included in your Gateway notebook. Don’t forget to answer the questions in the conclusion section,” says Ms. Open Ender as he turns to go to his office.

You quickly get to work creating a sketch of the shapes, then constraining and extruding them in order to replicate his box idea.

In this activity you will use Ms. Open Enders annotated drawing on the next page to create the new box idea.

Sketches with dimensions

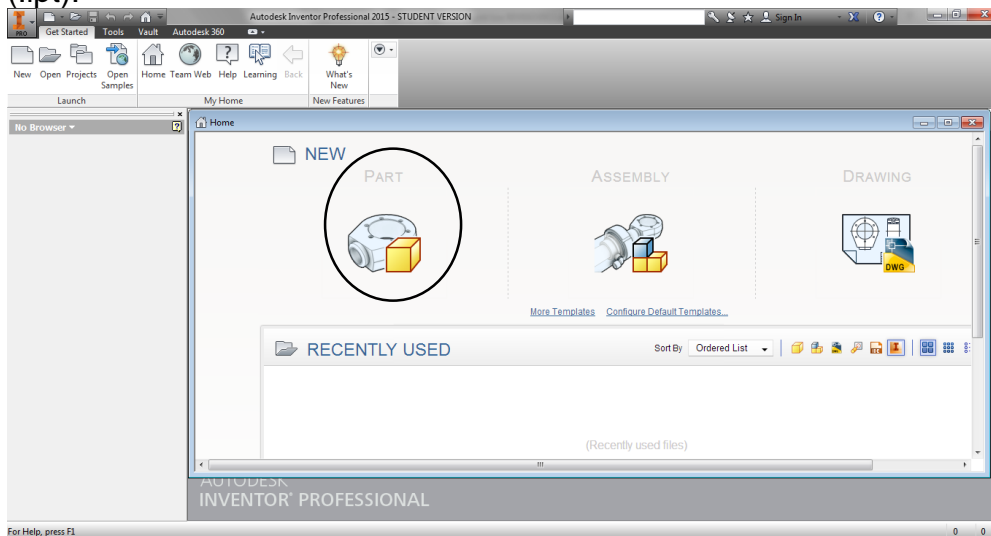


## Autodesk Inventor instructions

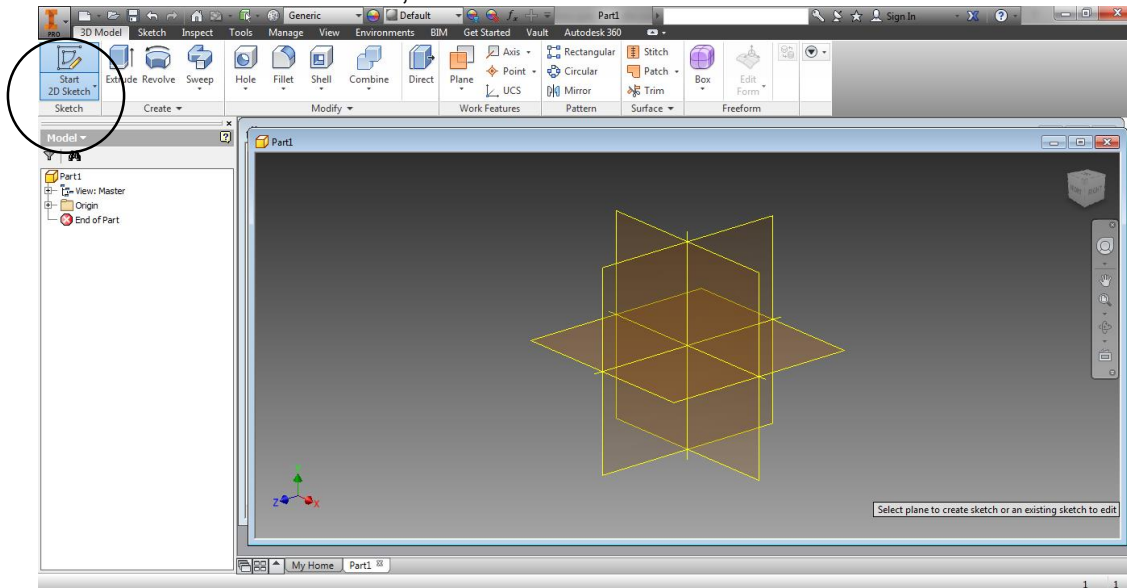
1. Click on the Autodesk Inventor Professional 2015 shortcut on your desktop. (This will take a little while to load so don't keep clicking it).



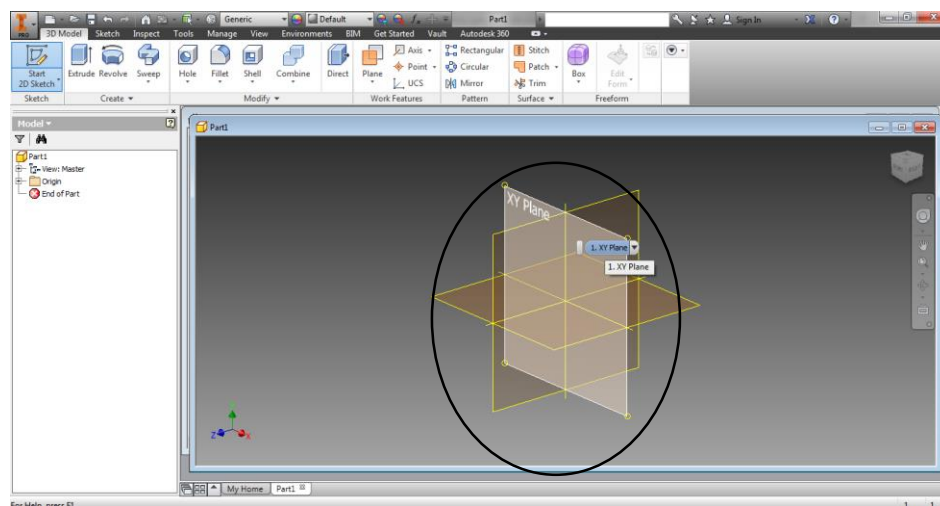
2. When the program finishes loading it will look like the picture below. On the Home Tab that loads automatically, double click on the New Part icon to open a new part file (.ipt).



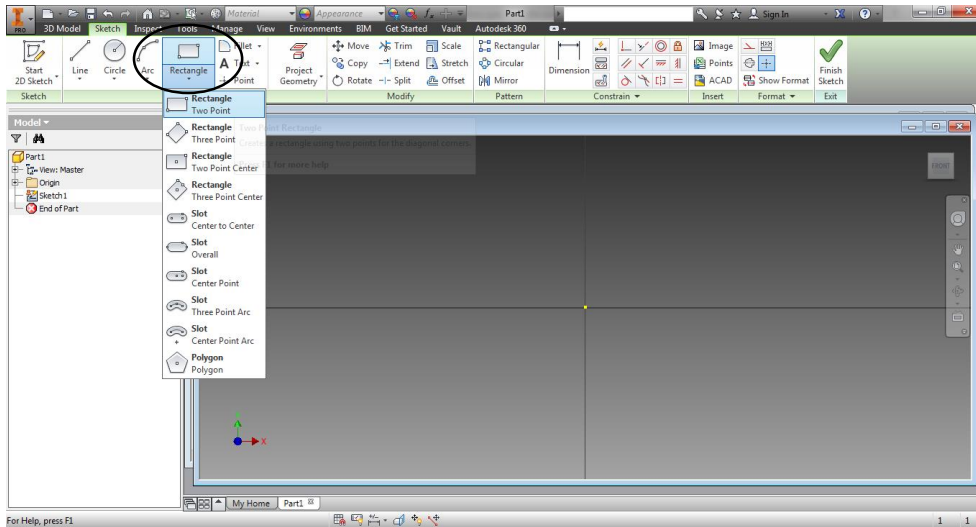
### 3. From the 3D Model tab, choose Start 2D Sketch.



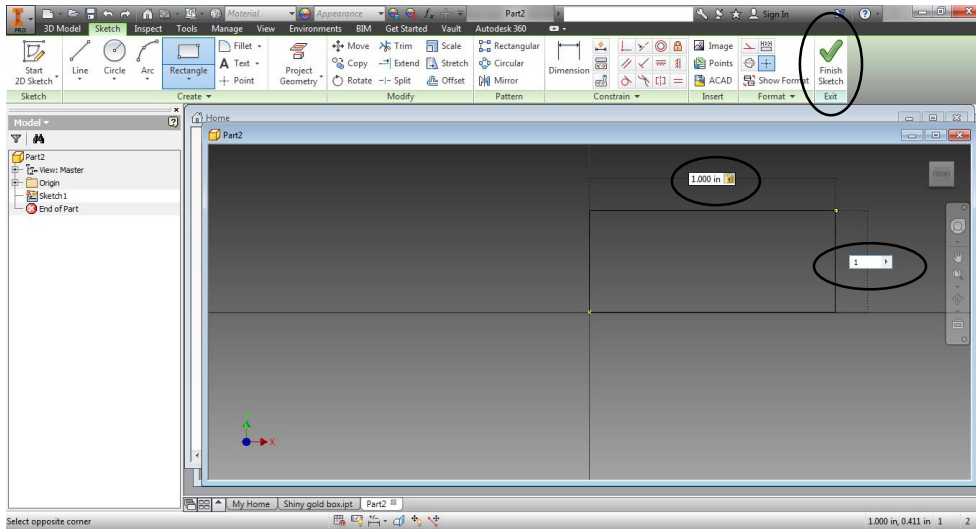
### 4. Hover your mouse over the XY plane shown below and then left click on it.



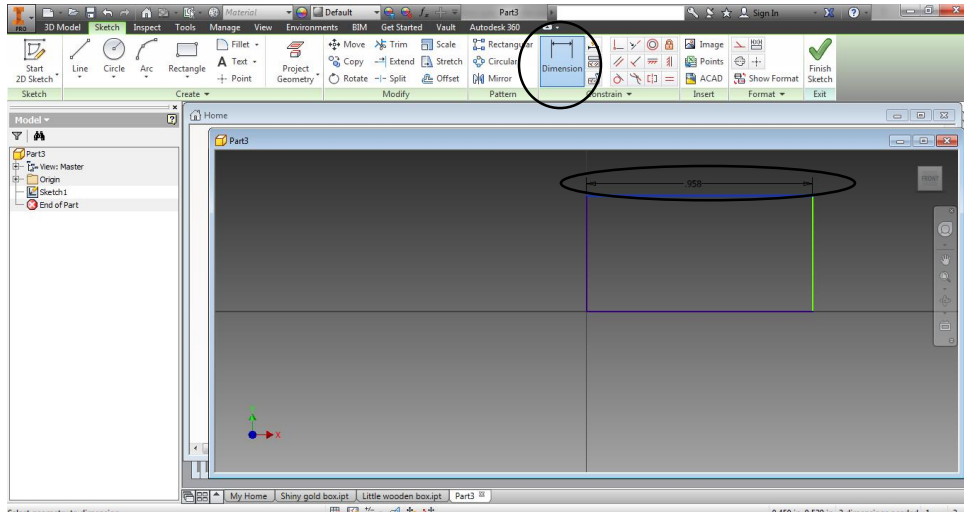
5. Go to Rectangle and then click on Rectangle Two Point.



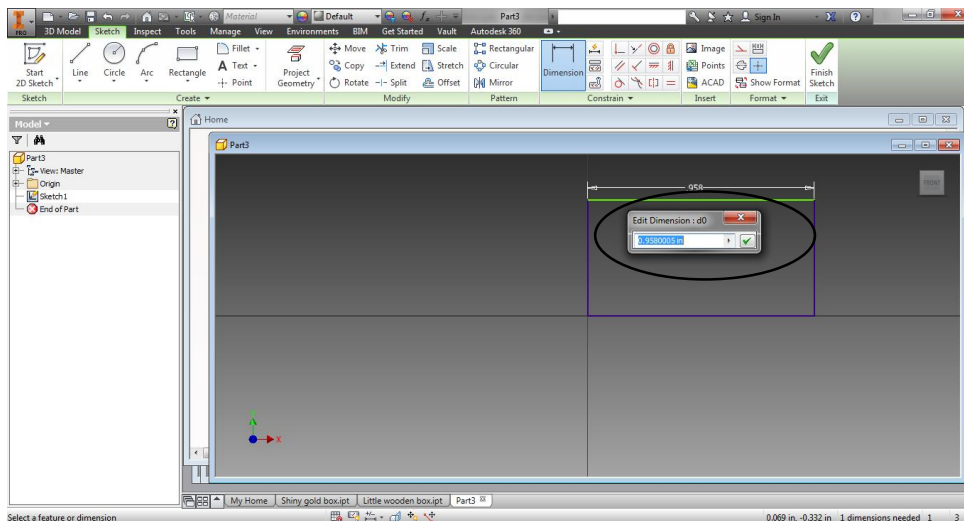
6. In the middle of the screen you will see a small yellow dot called the origin center point. Hover over the origin center point (the dot will turn green), then left click on it (it goes back to yellow), let go and then drag the mouse to the upper right quadrant to start making a box shape. Before you click to place it, type 2 (which will replace the blue numbers in the top rectangle box) and then hit the TAB key on the keyboard to move it to the second box on the right and change that value to 2 and hit the Enter key on the keyboard. Click Finish Sketch (the big green checkmark).



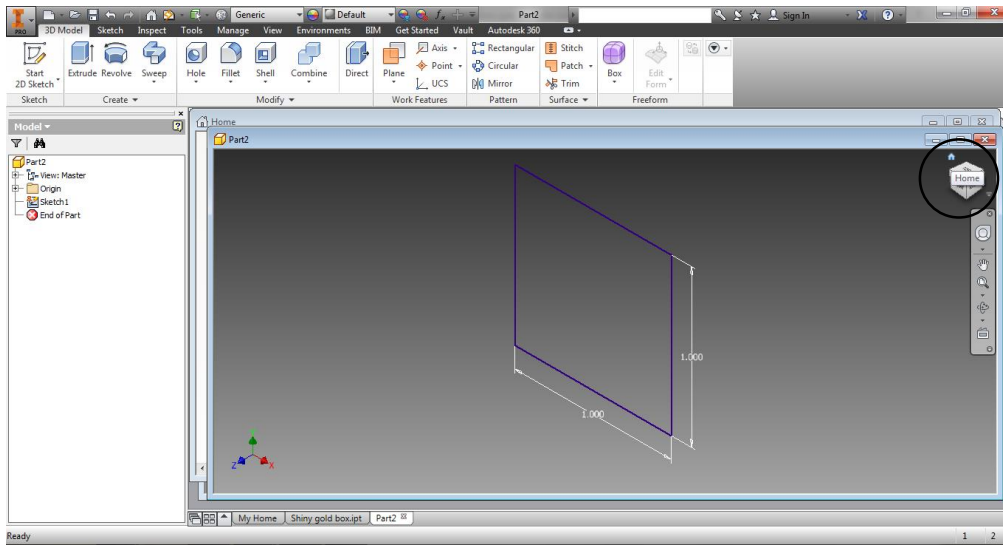
**NOTE:** If you forget to use the TAB key, you can manually dimension your model by going to the menu and clicking on Dimension.



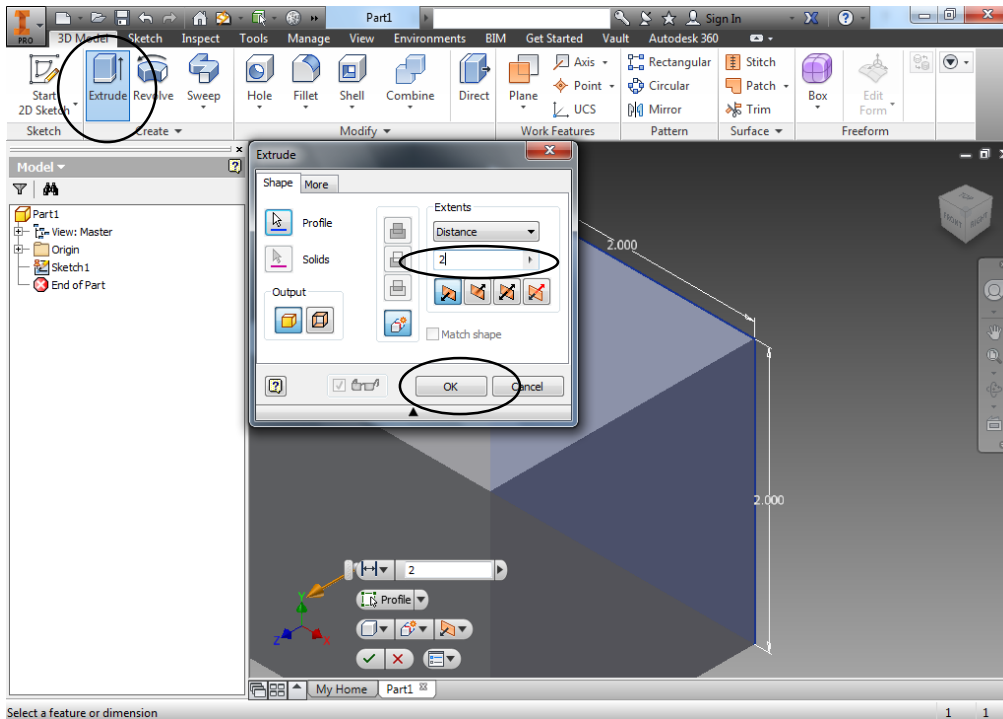
Click on the side of the model that you want to dimension and pull the dimension bar out. Click again to place it and have the box open to input the dimension you want.



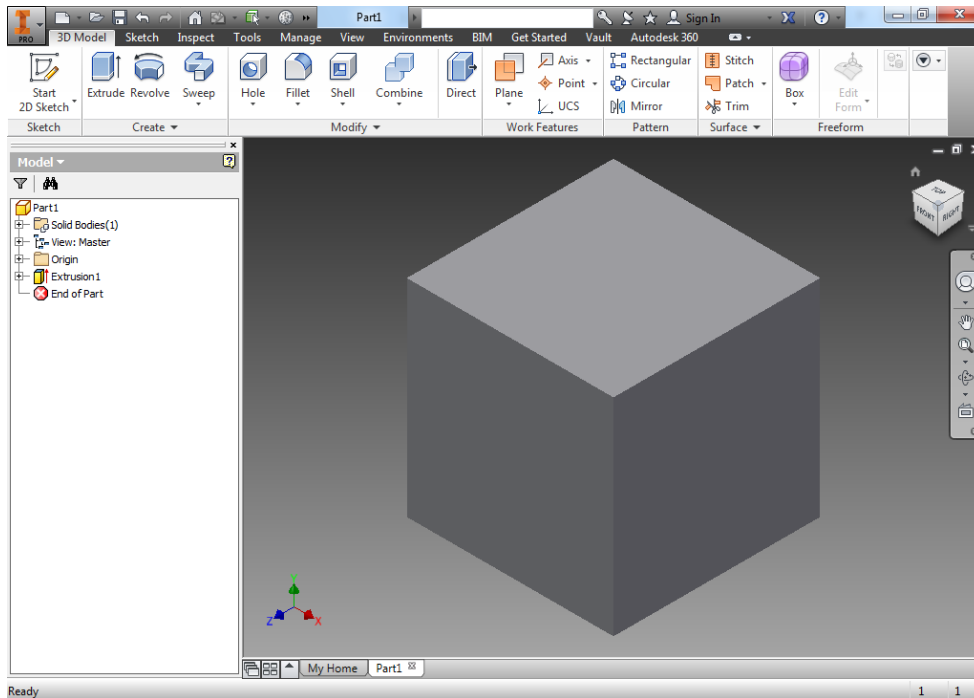
7. Bring the model back into view by clicking on the Home button (the little house) above the View Cube.



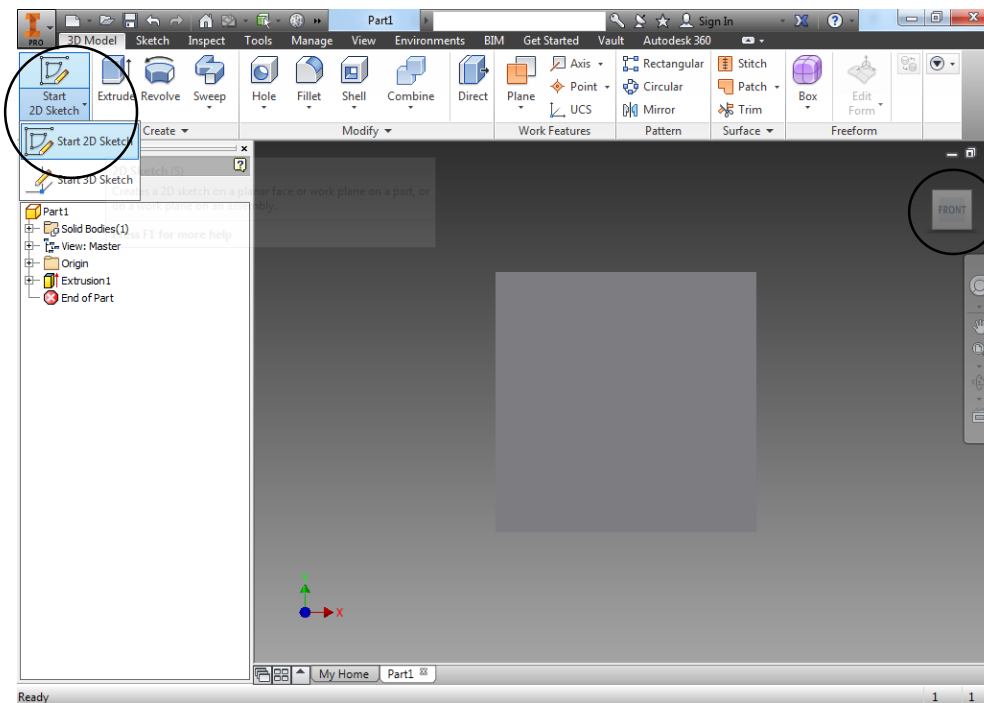
8. Choose Extrude from the Model menu, and change the distance extent to 2 inch and click OK.



9. Bring the model back into view by clicking on the Home button (the little house) above the View Cube.

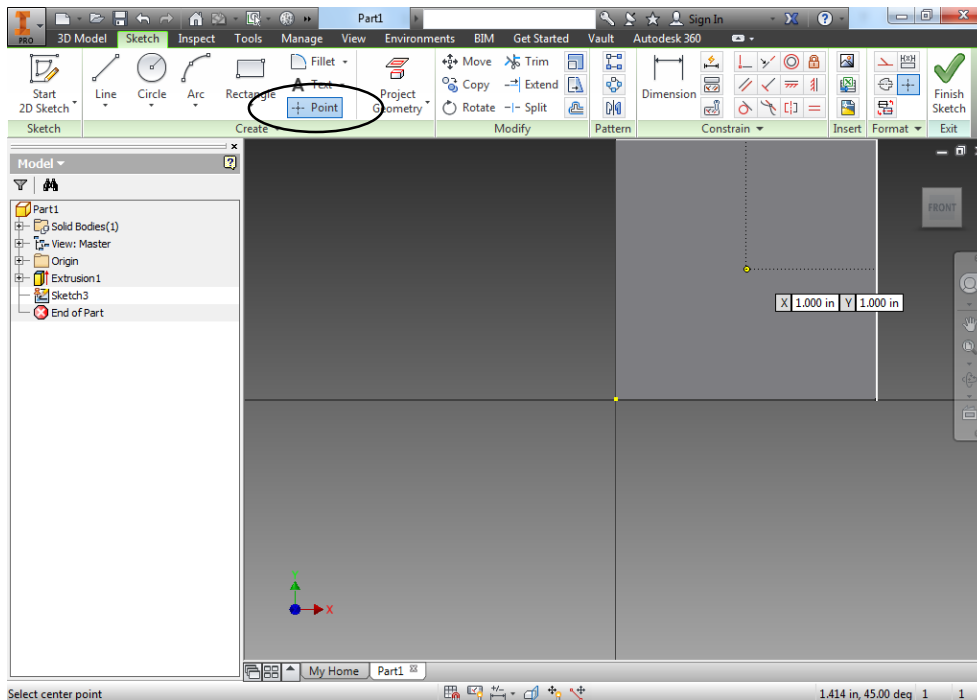


10. Click on the View Cube and select the side that says Front. Then click Create 2D Sketch and click on the front of the box you have made.

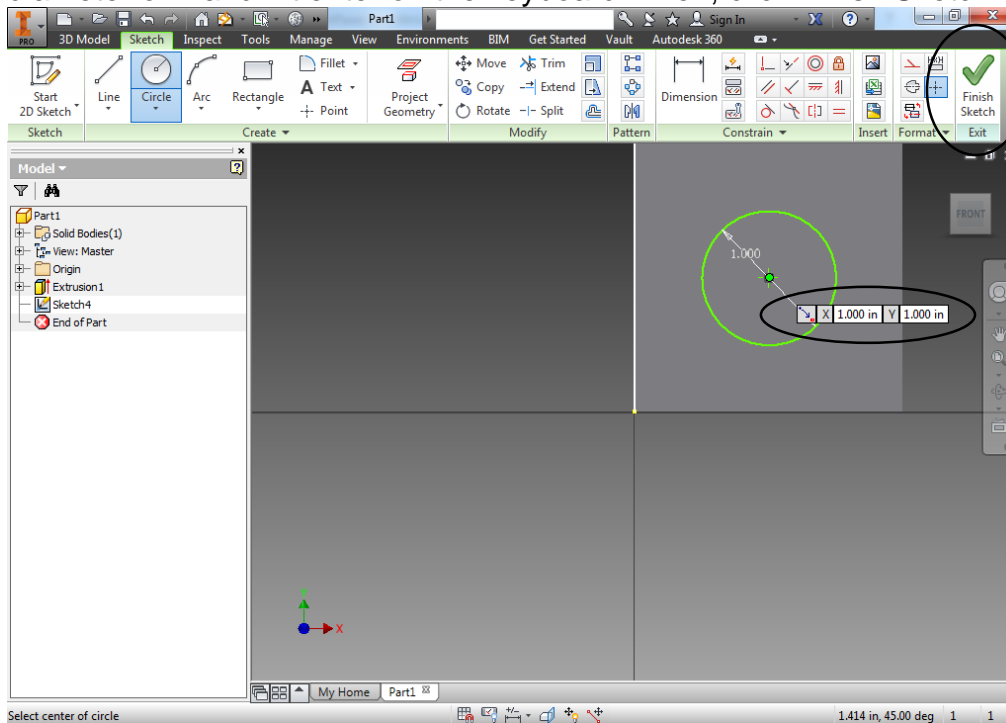




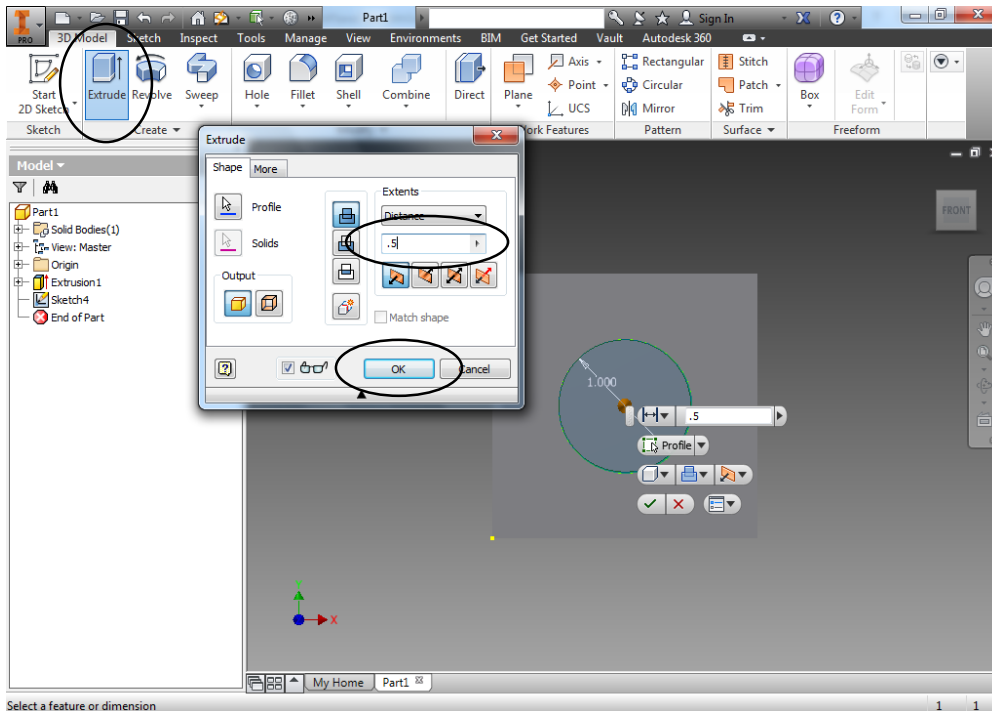
11. Place a Point (plus sign +) in the middle of the box. If you hover slowly you will see the X and Y axis display as 1.000 with two little dotted black lines. Click to place the point (which will be exactly in the center).



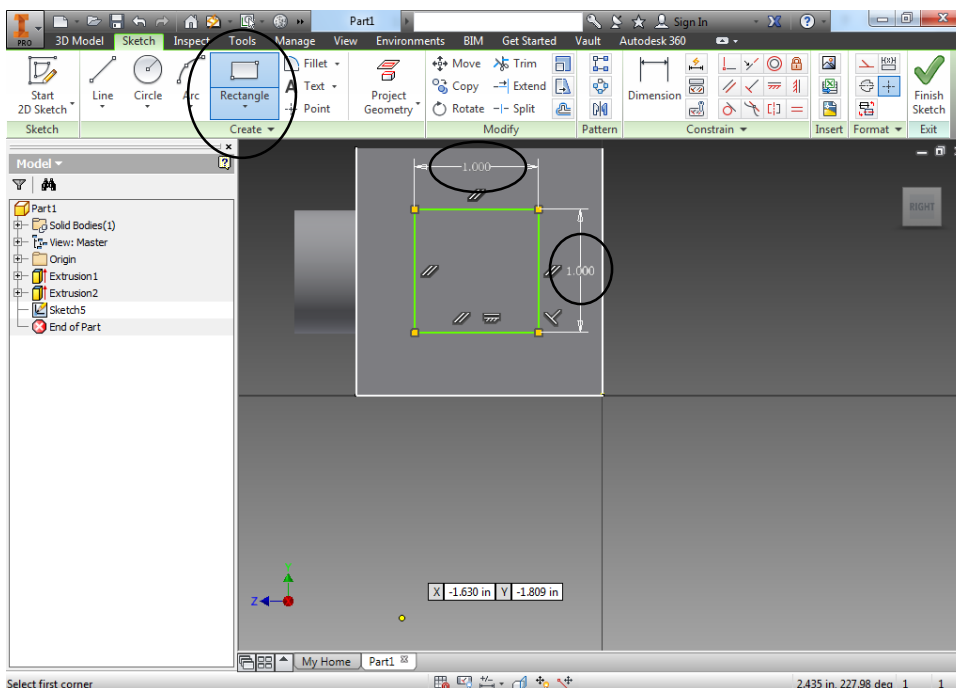
12. Click on Circle Center Point and draw a circle with your Point as the center (it will turn into a bright green dot if you are in the exact center). Dimension the circle to the diameter of 1 and hit enter on the keyboard. Then, click Finish Sketch.



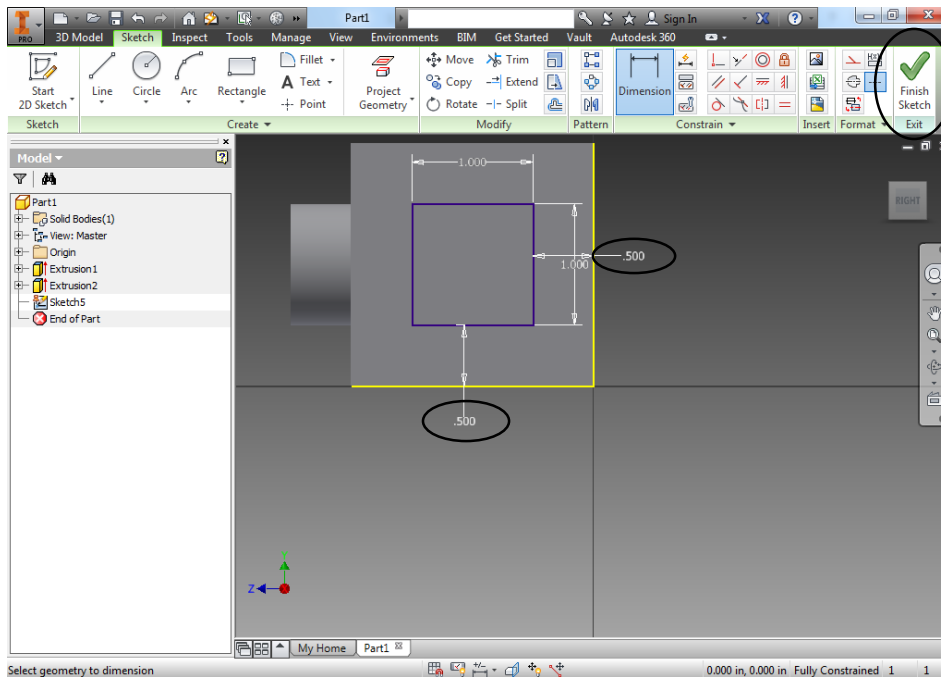
13. Click on Extrude and then click on the circle to select it. Set the Distance extent to .5 and click OK.



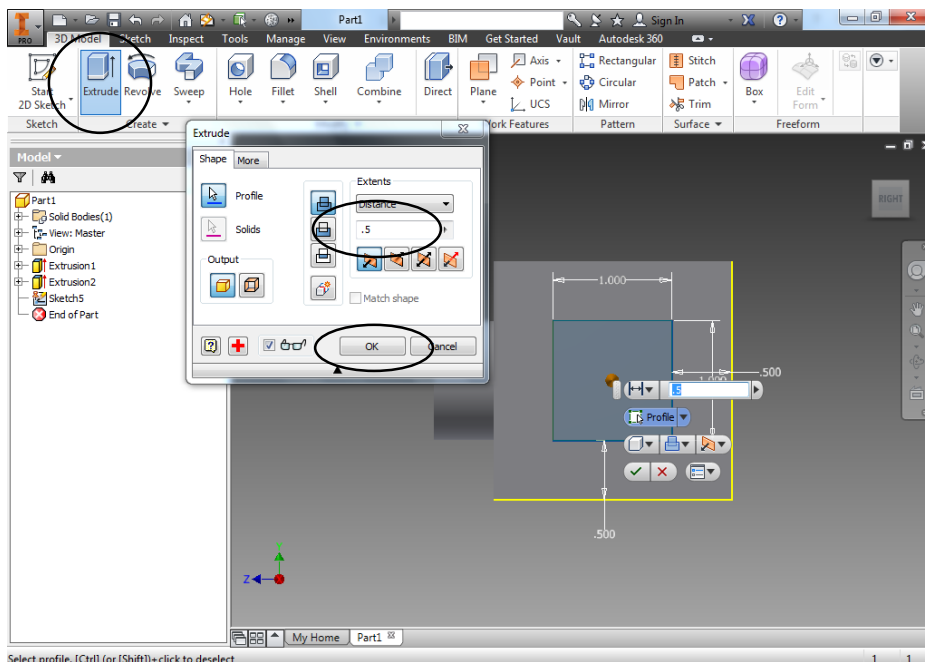
14. Click on the Home button above the View Cube and then click on the Right side view off the view cube. Click Create 2D Sketch. Click on the front of the square. Click Rectangle Two Point and make a smaller box inside it by clicking once and then dragging the mouse to expand the shape. Before you click to place it, type 1 (which will replace the blue numbers in the top rectangle box) and then hit the TAB key on the keyboard to move it to the second box on the right and change that value to 1 and hit the Enter key on the keyboard.



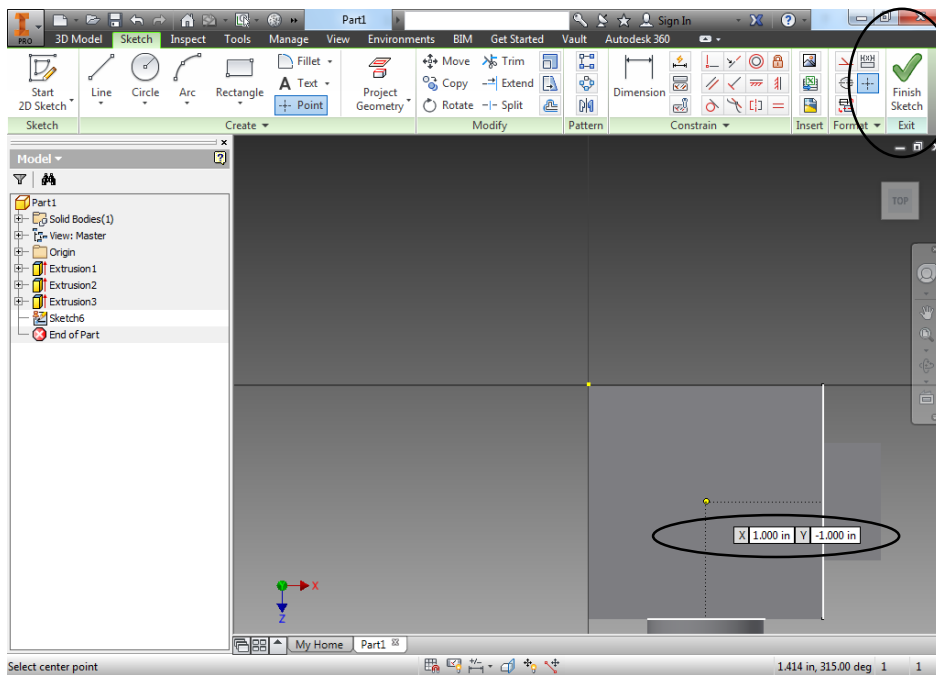
15. Click on Dimension. Hover over the right side of the 2-point rectangle you created until it turns grey and shows a small double arrow, then click and move the mouse to the right until you see the measurement/dimension displayed, then click to place it. Edit the dimension to 1. Then Dimension the lower right hand part of the smaller square to be .5 from the right and .5 from the bottom. Then click Finish Sketch.



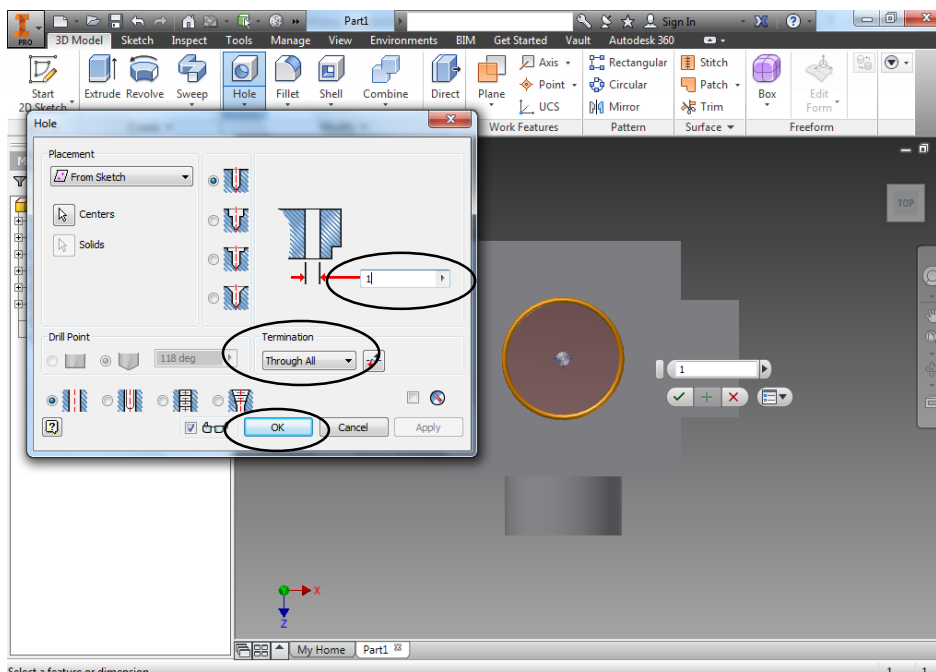
16. Click on Extrude and click on the smaller square inside to select it. Set the Distance extent to .5 and click OK.



17. Click on the Home button above the View Cube and then click on the Top view of the View Cube and then click Create 2D Sketch. Click on the side of the square facing you. Place a Point (plus sign +) in the middle of the box. If you hover slowly you will see the X and Y axis display as 1.000 with two little dotted black lines. Click to place the point (which will be exactly in the center). Click Finish Sketch.



18. Click Hole. Make sure the Termination is Through All and the diameter is 1 inch. Click OK.



19. Click on the Home button above the View Cube, choose a color of your choice from the Generic or Default dropdown menus, and then save this project as Sketch Plane Cube. Print screen this assignment and complete the conclusion document to submit to the LMS.

