How to Create a Cube in 3D AutoCAD: Using 3D Faces and Regions

As an Architectural Engineering student you will often be creating computer models in AutoCAD to load into other modeling software. Computer programs, such as AGi32 and 3ds Max can only import models that consist of 3D Faces or Regions. The purpose of this in-class assignment is to introduce you to 3D Faces and Regions. You will be creating a 3D cube to practice techniques touched on in previous in-class assignments, as well as become familiar with 3D Faces and Regions.

Preliminary AutoCAD Settings

1. Change the AutoCAD workspace to “3D Modeling” mode.

2. Under “Drawing Utilities” Select “Units”. Change unit type to “Architectural” and select OK.

3. Change the model space to an “X-Ray” view in the upper left hand corner of the model space.
Creating the Model Lines of the Cube

1. Go to a “Top View” using the View Cube.

2. Draw a 2”x2” square using the line command.

3. Select the Fillet icon. (Reference the figure below)

4. Type “R” for radius and set the radius to 1/8”.

5. Create 4 rounded corners.  
   **Note:** Reference previous “In-Class 2” assignment sheet for a reminder of how to use the fillet tool if necessary.

6. Select the Offset icon. (Reference the figure below)

7. “Specify Offset Distance” to 1/8”.

8. Offset the lines of the exterior square to the inside. These exterior and interior squares will be referred to as the squares on the Z=0 plane.  
   **Note:** Reference previous “In-Class 2” assignment sheet for a reminder of how to use the offset tool if necessary.

9. Change to a “Southeast View” using the View Cube seen below.
10. Select all lines and corners and copy them 2” in the positive Z direction. These squares will be referred to as the squares on the Z=2 plane. Compare your AutoCAD model to the figure below.

![Z=2 Z=0](image)

11. Copy the inside square on the Z=0 to Z=1/8” and Z=1-7/8". Can be seen in RED in the figure below.

![RED shape](image)

Creating the Regions of the Cube

**What are Regions?**

Regions convert an object that encloses an area into a region object. They are 2D areas you create from closed shapes or loops. Closed polylines, lines and curves are valid selections.

**What Can You Do with Regions?**

After a region is created you can then use the “EXTRUDE” command to create 3D Solids. Regions also create a surface in which you can put a hole in, unlike lines with thickness.

1. Select the Region icon. (Reference figure below)

![Region icon](image)

2. Select the four lines on the Z=1/8” plane and hit the Enter key. **Command prompt at the bottom should say “1 region created”**.

   **Note:** If a region was not created then it usually means there is a gap in the shape. Check to make sure all corners are touching.
3. Repeat Steps 1 and 2, from this section, for the four lines on the Z=1-7/8” plane.

4. In the properties box, change the color to RED.

5. Create a region by selecting all lines of the exterior square on the Z=0 plane.

6. Create a second region by selecting all lines of the exterior square on the Z=2 plane. Compare your AutoCAD model to the figure below.

7. Go back to the properties box and change the color to BLUE.

8. Create another region by selecting all lines of the interior square on the Z=0 plane.

9. Create second region by selecting all lines of the interior square on the Z=2 plane.

10. Select the “Subtract” tool. (Reference figure below)

*Note: Reference previous “In-Class 2” assignment sheet for a reminder of how to use the subtract tool if necessary.

11. On the Z=0 plane, use the subtract tool to subtract the BLUE region from the RED region. This creates a RED boarder. Compare your model in AutoCAD to the figure below.
Creating the 3D Faces of the Cube

What are 3D Faces?
The **3D Face** tool creates a three-sided or four-sided surface in 3D space.

What Can You Do with 3D Faces?
Similar to a region, after a 3D Face is created you can then use the “EXTRUDE” command to create 3D Solids. Regions also create a surface in which you can put a hole.

How to create a 3D Face?
A 3D Face is created automatically after selecting 4 points in the model space.

1. Type “3F” in the command bar to activate the 3D face tool.

2. Use **3D Faces** to create four 1/8” sides to complete the area where the letter will be placed on the cube’s top face (Z=2).

3. Use **3D Faces** to create four more 1/8” sides to complete the area where the letter will be placed on the cube’s bottom face (Z=0). Compare your AutoCAD model to the figure below.

4. In the properties box, change the color to **YELLOW** and create four 3D Faces for the sides. Compare your AutoCAD model to the figure below.

5. Create 3D Faces that go diagonally across the rounded corners, as seen in the figure below.
Creating the Letters on the Cube

1. Create a new text style called ‘True Type’, using the Arial font with a height of 1-1/2” and width factor of 1. Click “Apply”, then “Close”.

2. Set elevation=0 and thickness=1/8”.

3. Click anywhere on the screen to get the cursor to appear.

4. Type the first letter of your first name.

5. In a “Top View” (use the View Cube) use a polyline to outline your letter.

6. Use regions to create a region of your letter.

7. Once the region is created, select the “Extrude” button (reference figure below) and then click on the region that was created in Step 6 of this section.

8. Extrude the region 1/8” in the positive Z direction.

9. Move the 3D letter around to center it on the bottom face of the square.

10. Copy the letter up to a height of 1-7/8” and place it on the top face.
11. Your final cube should resemble the image below.

For additional help, you may contact me via email to ask questions or set up a meeting outside of class.