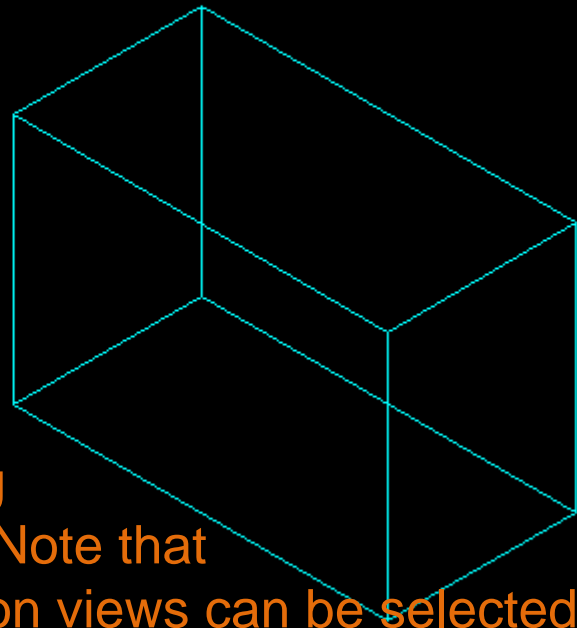


SWITCHING BETWEEN 2D & 3D

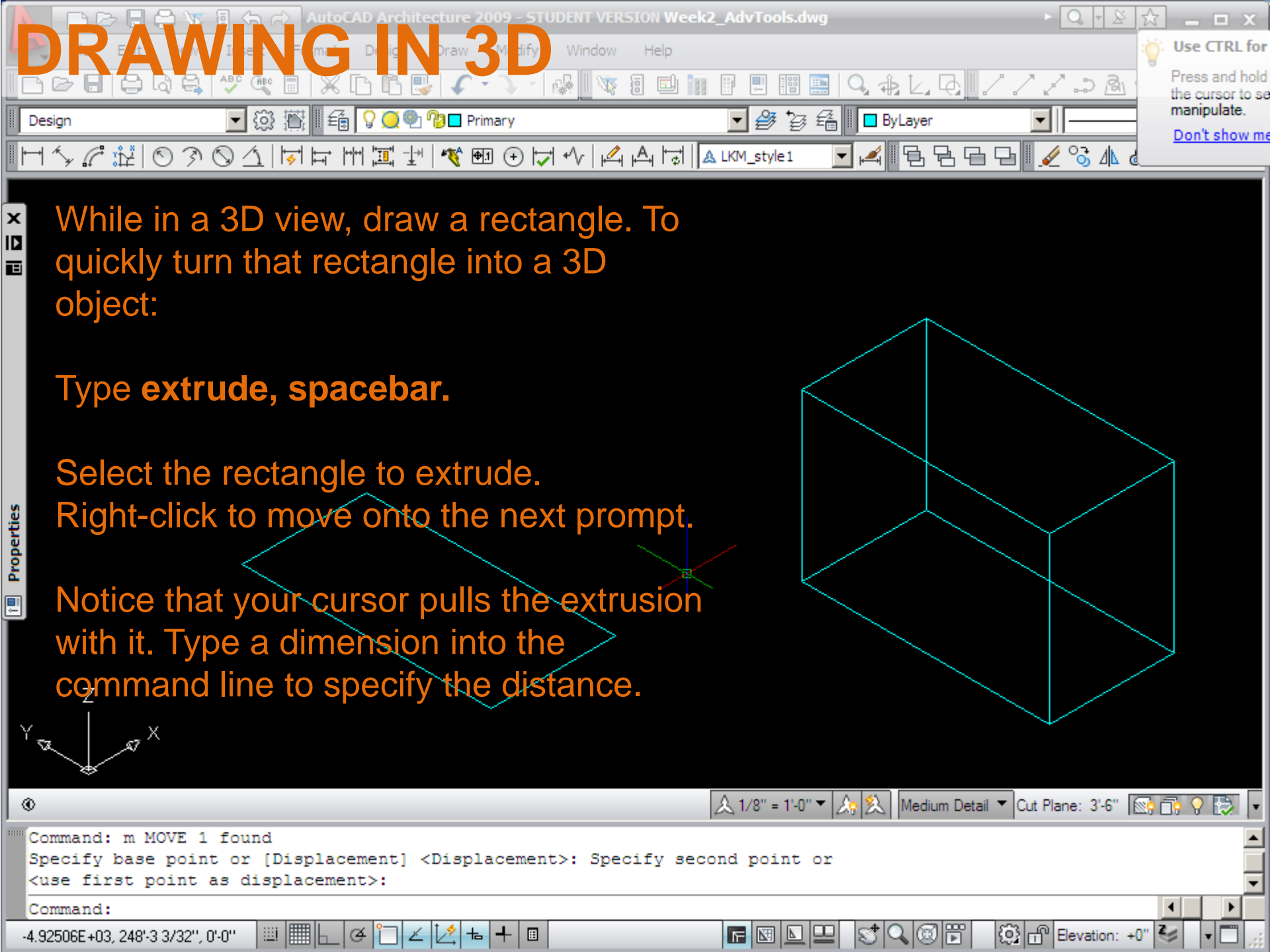
Switch between 2D and 3D views using the **View menu>3D Views>SW Isometric**, etc.

Select **Top** to return to a 2D viewing mode. Note that elevation views can be selected here as well: **Left, Right**, etc.



Press ESC or ENTER to exit, or right-click to display shortcut menu.
Command: p PAN
Press ESC or ENTER to exit, or right-click to display shortcut menu.
Command:

Sets the view point to southwest isometric.



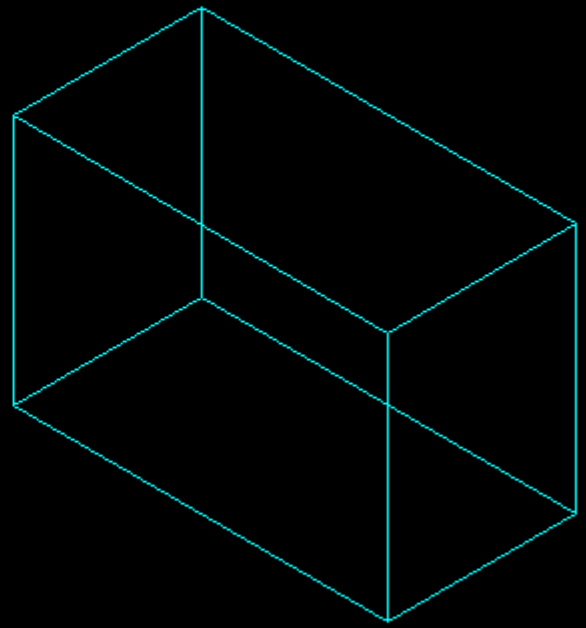
DRAWING IN 3D

While in a 3D view, draw a rectangle. To quickly turn that rectangle into a 3D object:

Type **extrude**, spacebar.

Select the rectangle to extrude. Right-click to move onto the next prompt.

Notice that your cursor pulls the extrusion with it. Type a dimension into the command line to specify the distance.



Command: m MOVE 1 found
Specify base point or [Displacement] <Displacement>: Specify second point or <use first point as displacement>:
Command:

-4.92506E+03, 248'-3 3/32", 0'-0" Elevation: +0"

PROPERTIES IN 3D

The Properties palette for a Polyline object is shown. It is divided into several sections: General, 3D Visualization, Geometry, and Misc. The Geometry section is highlighted with an orange arrow.

General	
Color	ByLayer
Layer	Primary
Linetype	ByLayer
Linetype scale	1.00000
Plot style	ByColor
Lineweight	ByLayer
Hyperlink	
Thickness	0"

3D Visualization	
Material	ByLayer

Geometry	
Vertex	1
Vertex X	-415'-7 7/32"
Vertex Y	247'-9 21/32"
Start segment w...	0"
End segment width	0"
Global width	0"
Elevation	0"
Area	2592.00000 s...
Length	18'-0"

Misc	
Closed	Yes
Linetype genera...	Disabled

Advanced

The Properties palette for a 3D Solid object is shown. It is divided into several sections: General, 3D Visualization, Geometry, and Solid History. The Geometry section is highlighted with an orange arrow.

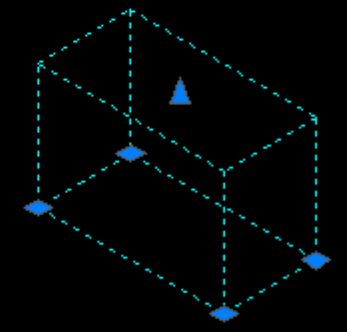
General	
Color	ByLayer
Layer	Primary
Linetype	ByLayer
Linetype scale	1.00000
Plot style	ByColor
Lineweight	ByLayer
Hyperlink	

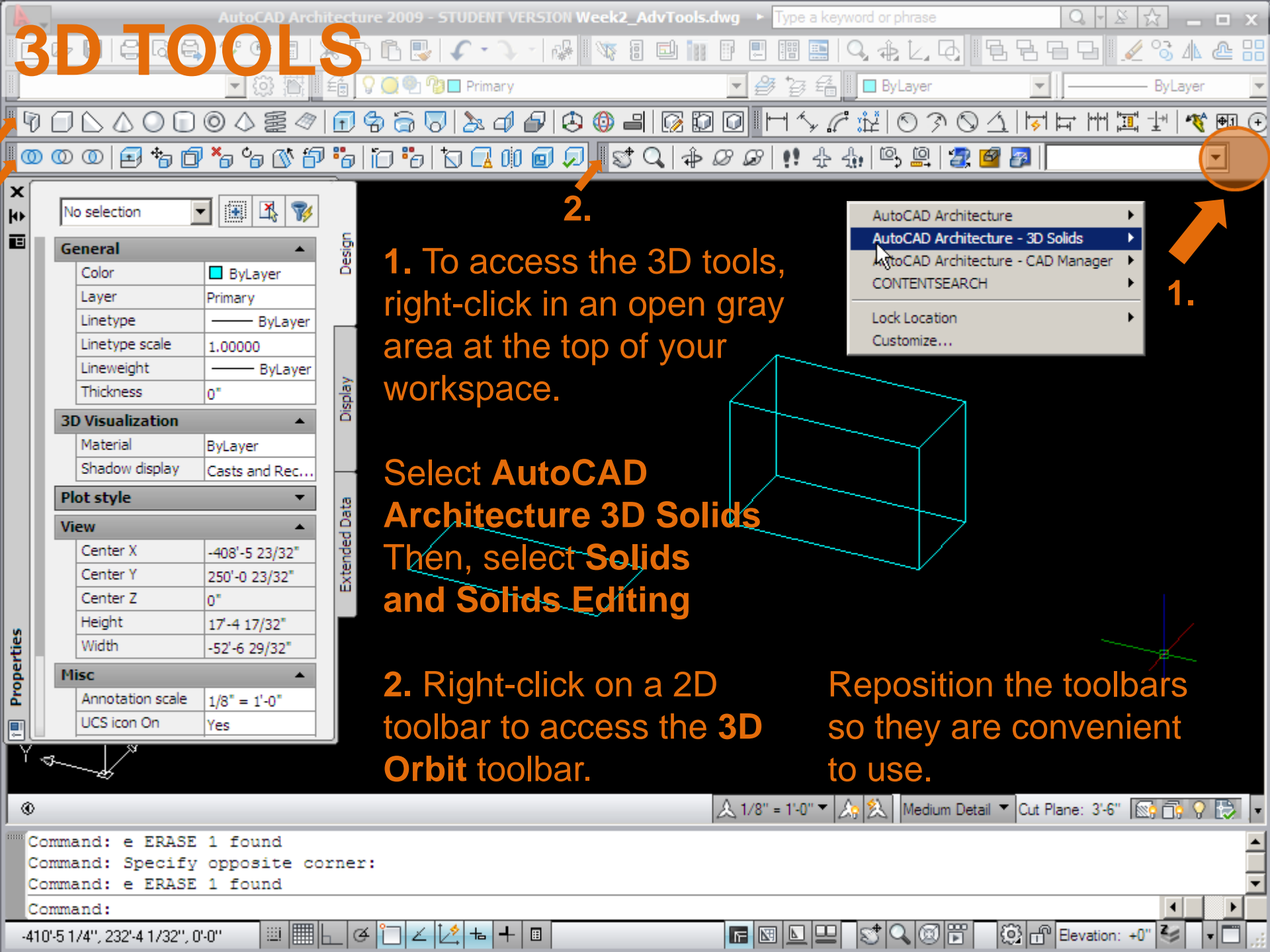
3D Visualization	
Material	ByLayer
Shadow display	Casts and Rec...

Geometry	
Solid type	Extrusion
Height	4'-0"
Taper angle	0.00
Direction X	0"
Direction Y	0"
Direction Z	4'-0"

Solid History	
History	Record
Show History	No

Notice the change in properties information specifically the object type and height.





3D TOOLS

2.

1. To access the 3D tools, right-click in an open gray area at the top of your workspace.

Select **AutoCAD Architecture 3D Solids**
Then, select **Solids** and **Solids Editing**

1.

2. Right-click on a 2D toolbar to access the **3D Orbit** toolbar.

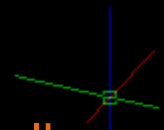
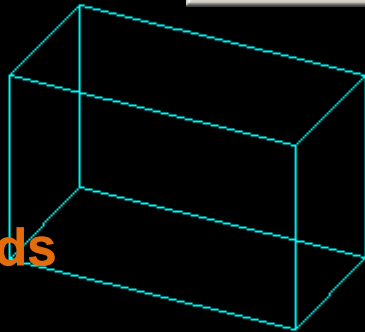
Reposition the toolbars so they are convenient to use.

Properties palette:

- General
 - Color: ByLayer
 - Layer: Primary
 - Linetype: ByLayer
 - Linetype scale: 1.00000
 - Lineweight: ByLayer
 - Thickness: 0"
- 3D Visualization
 - Material: ByLayer
 - Shadow display: Casts and Rec...
- Plot style: [dropdown]
- View
 - Center X: -408'-5 23/32"
 - Center Y: 250'-0 23/32"
 - Center Z: 0"
 - Height: 17'-4 17/32"
 - Width: -52'-6 29/32"
- Misc
 - Annotation scale: 1/8" = 1'-0"
 - UCS icon On: Yes

Context menu:

- AutoCAD Architecture
- AutoCAD Architecture - 3D Solids**
- AutoCAD Architecture - CAD Manager
- CONTENTSEARCH
- Lock Location
- Customize...

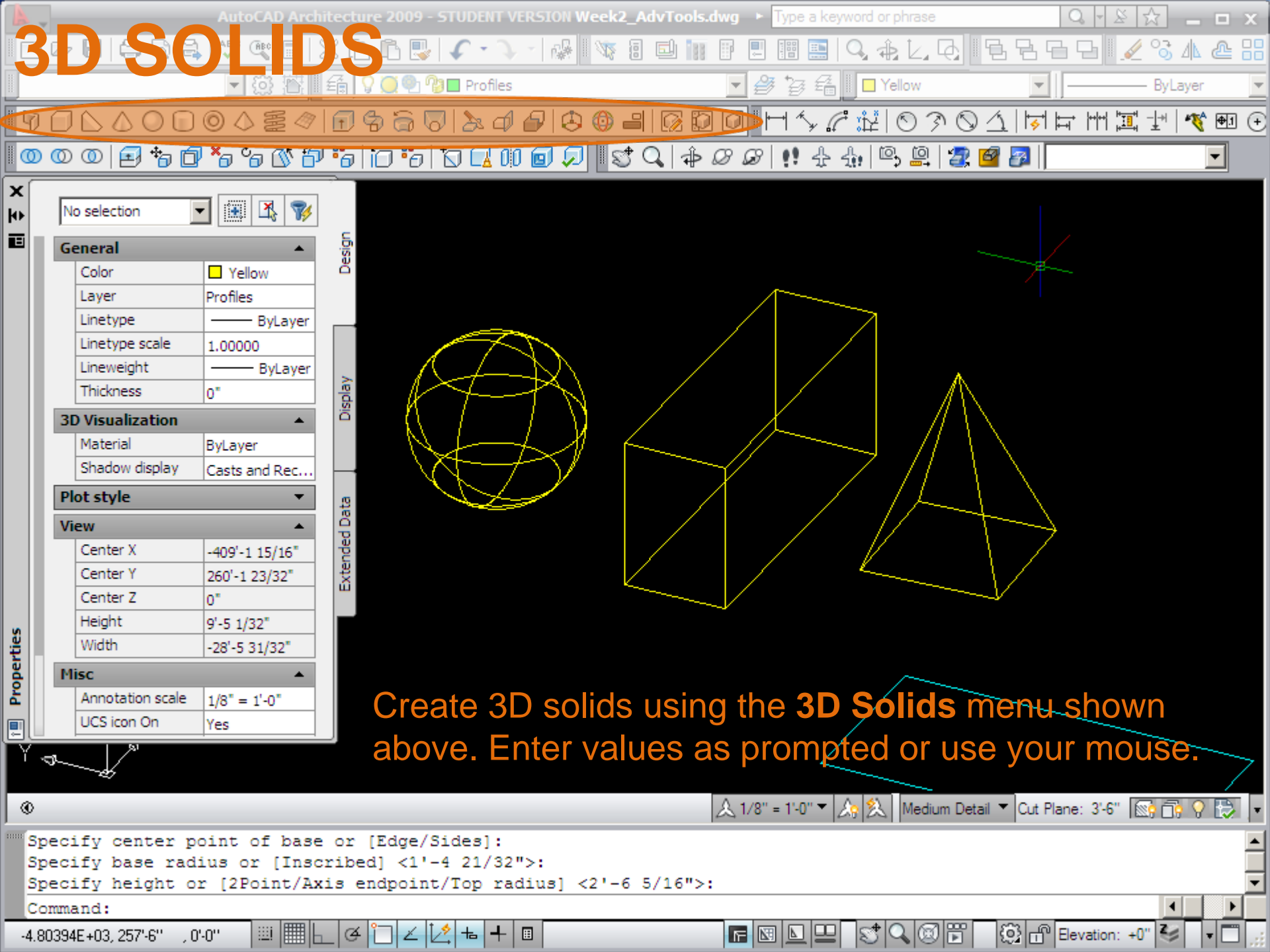


Command: e ERASE 1 found
Command: Specify opposite corner:
Command: e ERASE 1 found
Command:

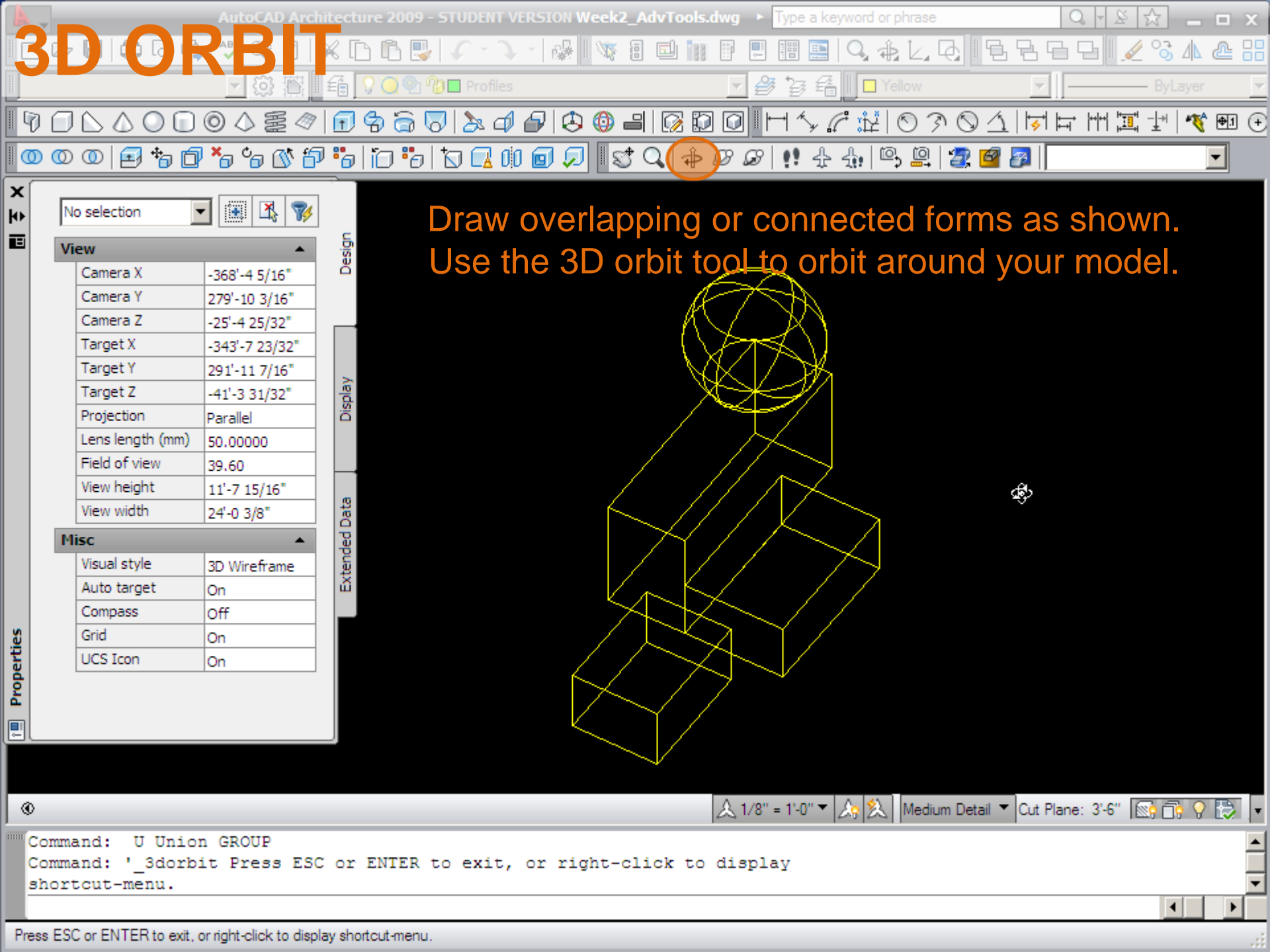
-410'-5 1/4", 232'-4 1/32", 0'-0"

Elevation: +0"

3D SOLIDS

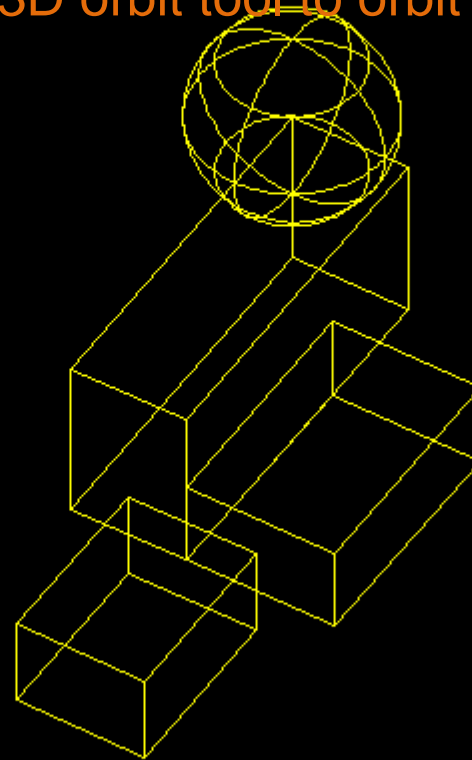


Create 3D solids using the **3D Solids** menu shown above. Enter values as prompted or use your mouse.



3D ORBIT

Draw overlapping or connected forms as shown.
Use the 3D orbit tool to orbit around your model.



No selection

View

Camera X	-368'-4 5/16"
Camera Y	279'-10 3/16"
Camera Z	-25'-4 25/32"
Target X	-343'-7 23/32"
Target Y	291'-11 7/16"
Target Z	-41'-3 31/32"
Projection	Parallel
Lens length (mm)	50.00000
Field of view	39.60
View height	11'-7 15/16"
View width	24'-0 3/8"

Misc

Visual style	3D Wireframe
Auto target	On
Compass	Off
Grid	On
UCS Icon	On

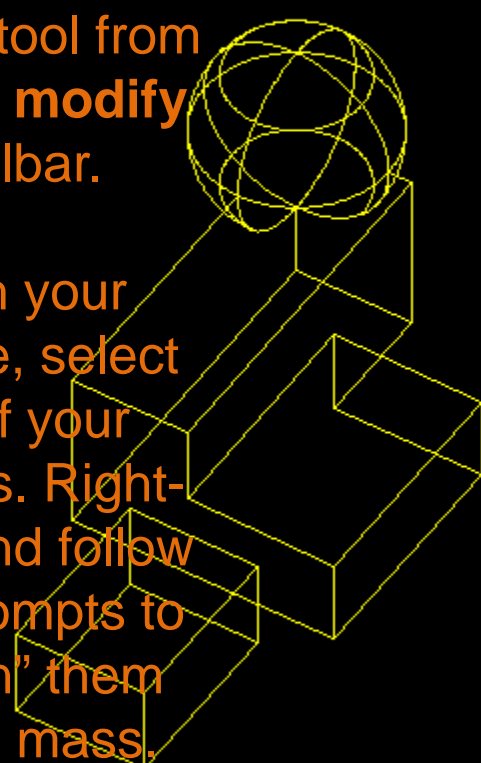
Command: U Union GROUP
Command: '_3dorbit Press ESC or ENTER to exit, or right-click to display shortcut-menu.

Press ESC or ENTER to exit, or right-click to display shortcut-menu.

UNION

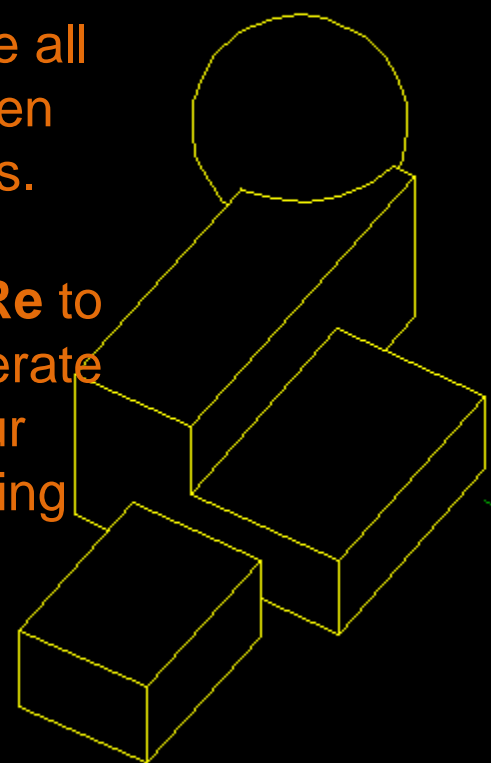
Select the **Union** tool from the **3D modify** toolbar.

With your mouse, select all of your objects. Right-click and follow the prompts to "union" them into a mass.



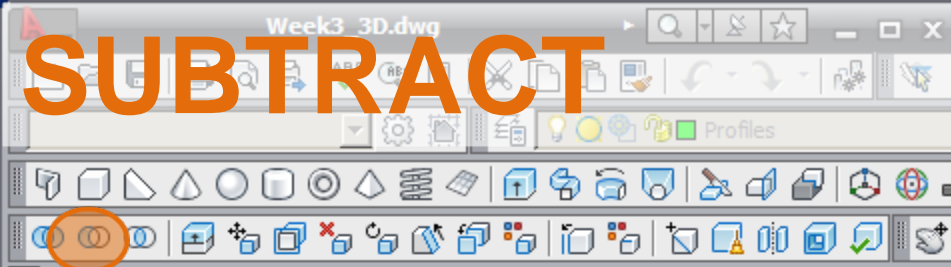
Type **Hide** to hide all hidden lines.

Type **Re** to regenerate your drawing



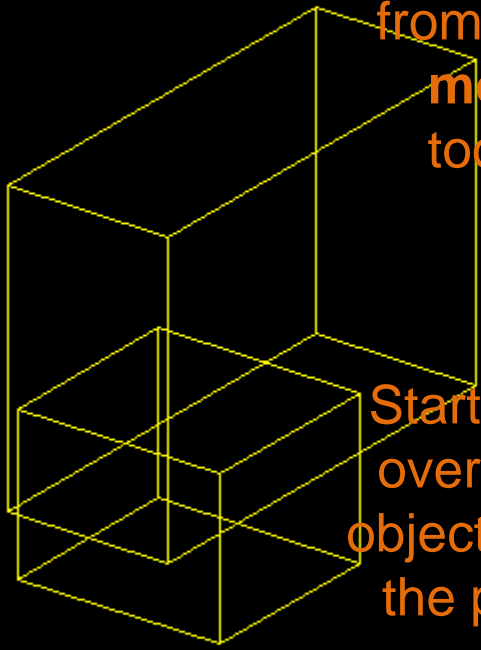
```
Done.  
Updating Indexes for block *Model_Space  
Done.  
Command:
```

```
Done.  
Command: hide  
Regenerating model.  
Command:
```

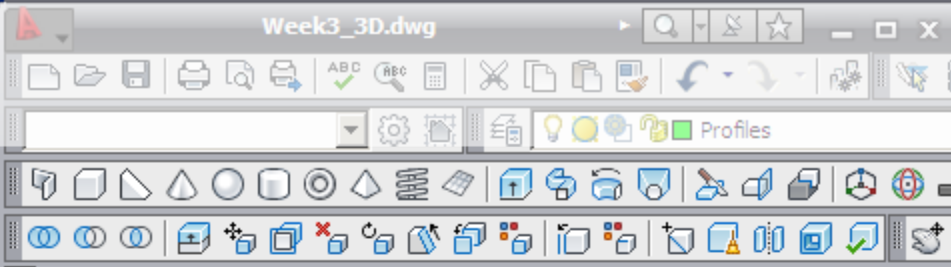
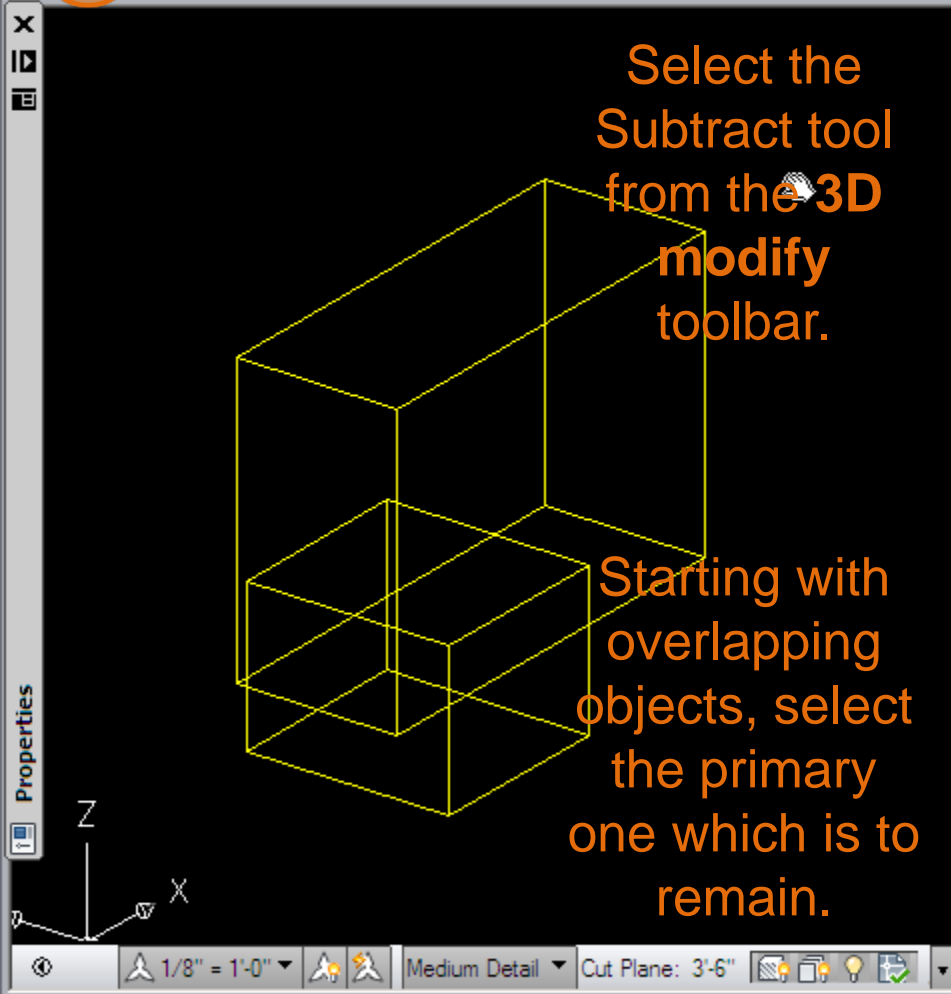



SUBTRACT

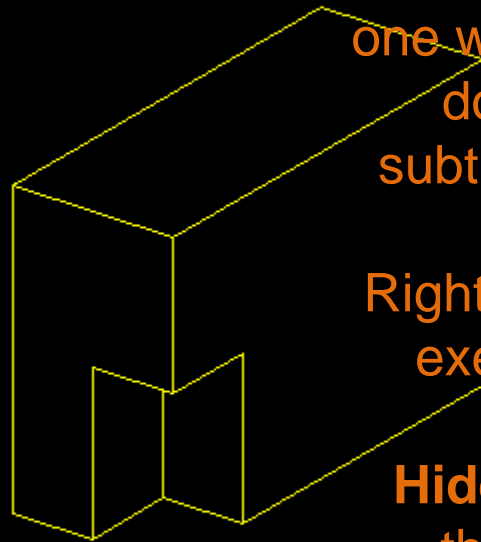
Select the Subtract tool from the 3D modify toolbar.



Starting with overlapping objects, select the primary one which is to remain.

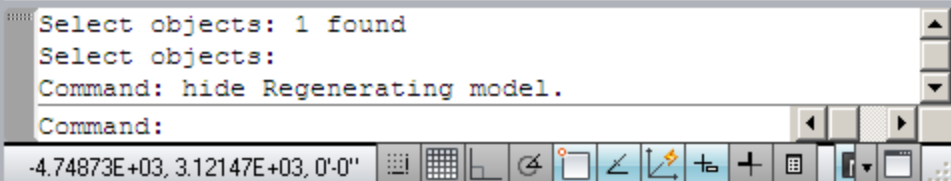
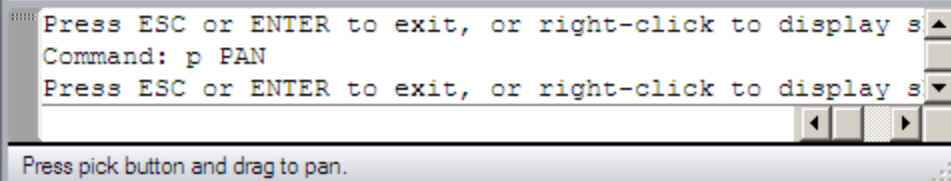
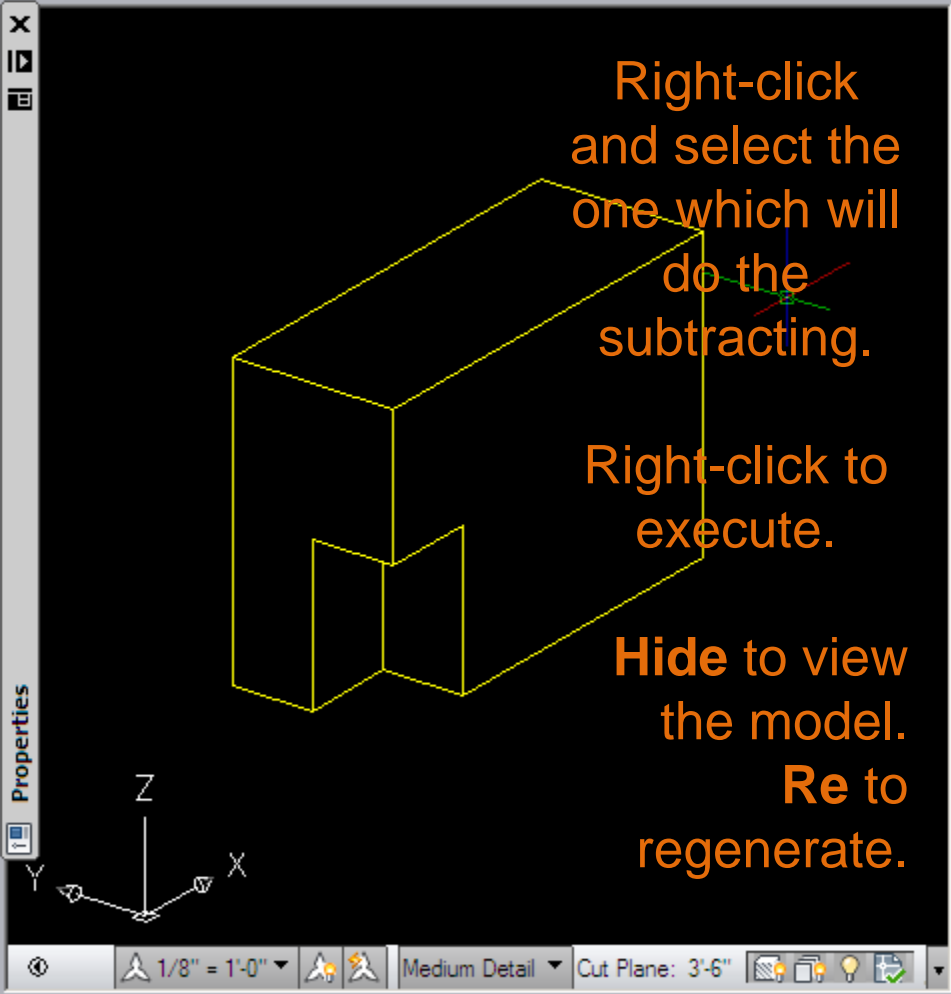


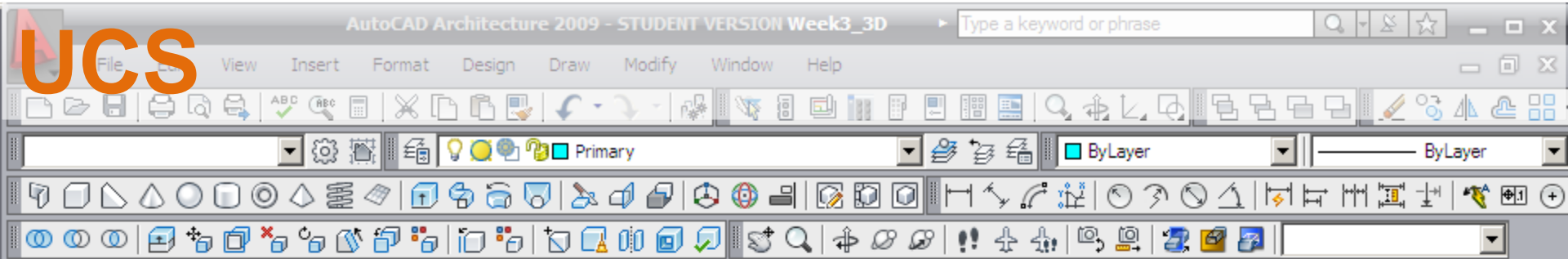
Right-click and select the one which will do the subtracting.



Right-click to execute.

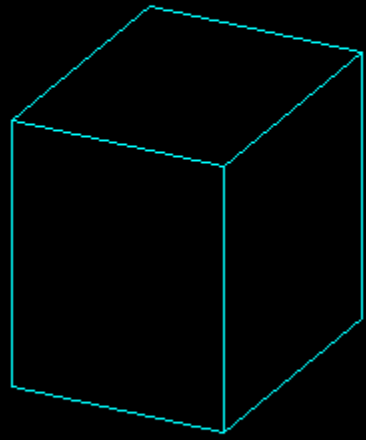
Hide to view the model.
Re to regenerate.



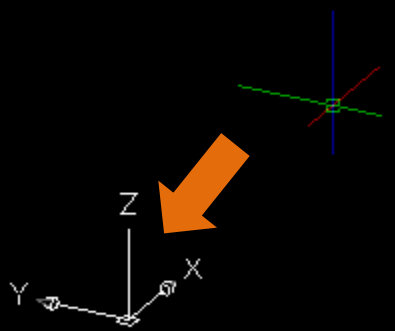


UCS

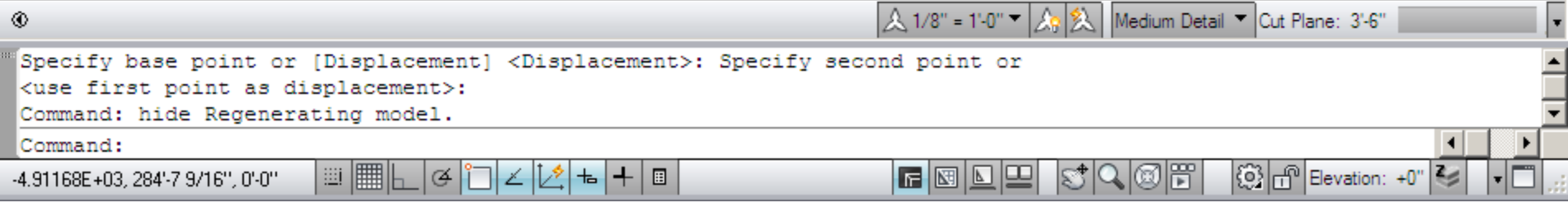
The UCS system (User Coordinate System) allows us to redefine where our drawing plane is.



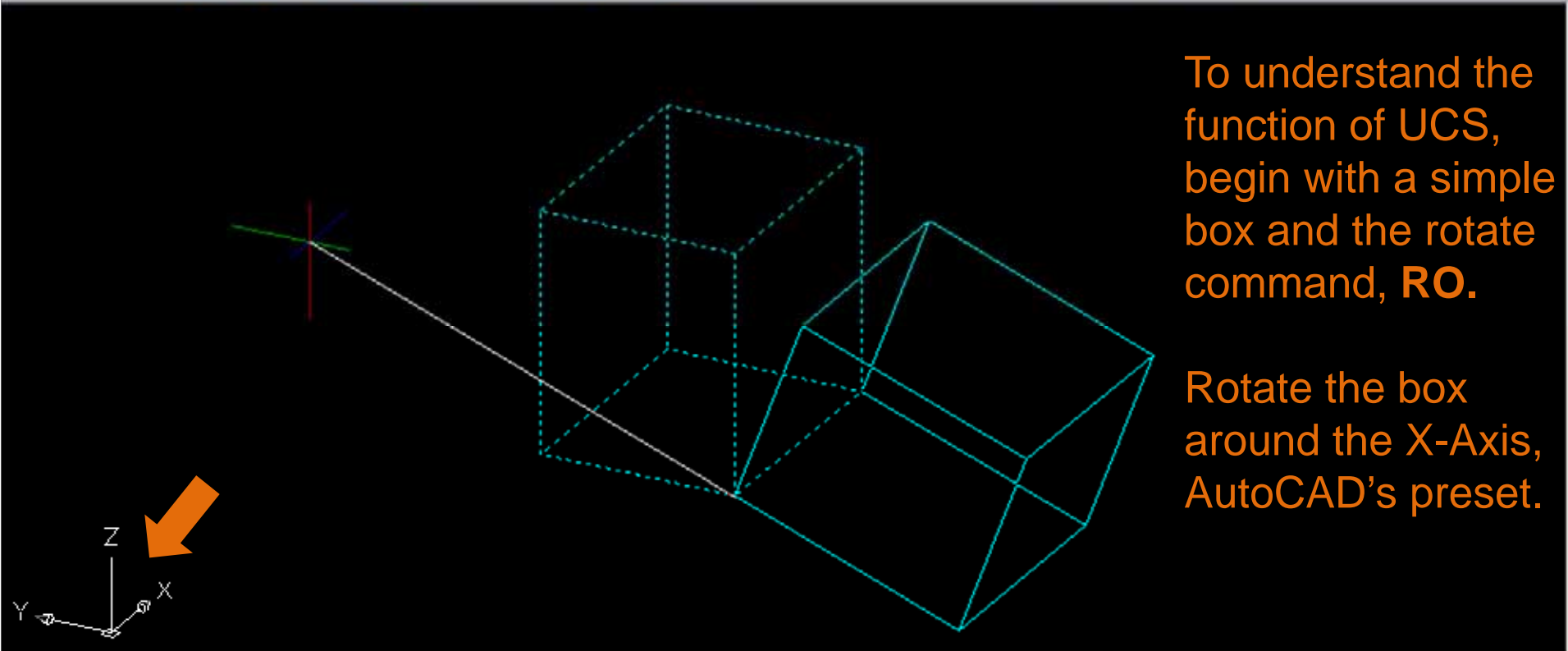
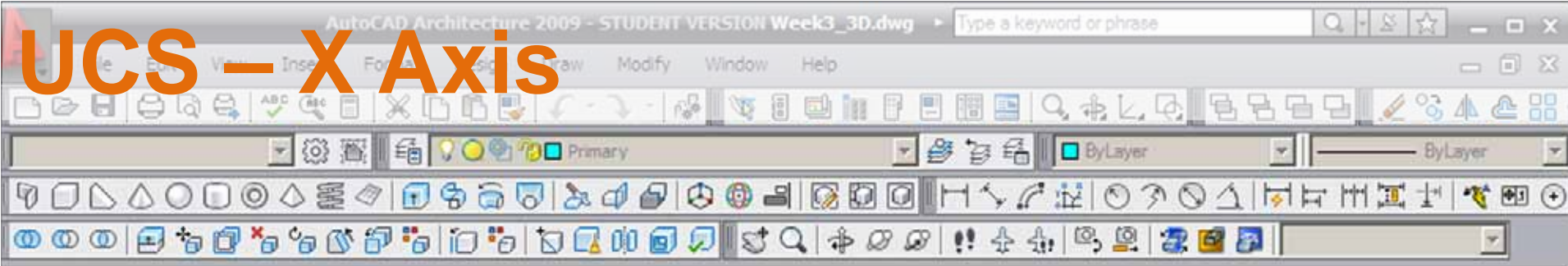
In 2D we drew in the WCS or World Coordinate System, one which presumes the ground plane is always in the same location, defined by X & Y axes.



It's often necessary to adjust this when working with the Z-axis in 3D.

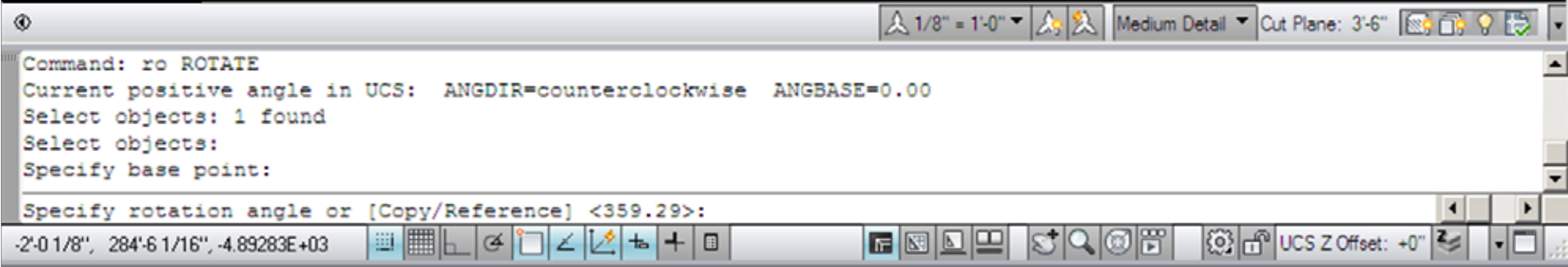


UCS – X Axis

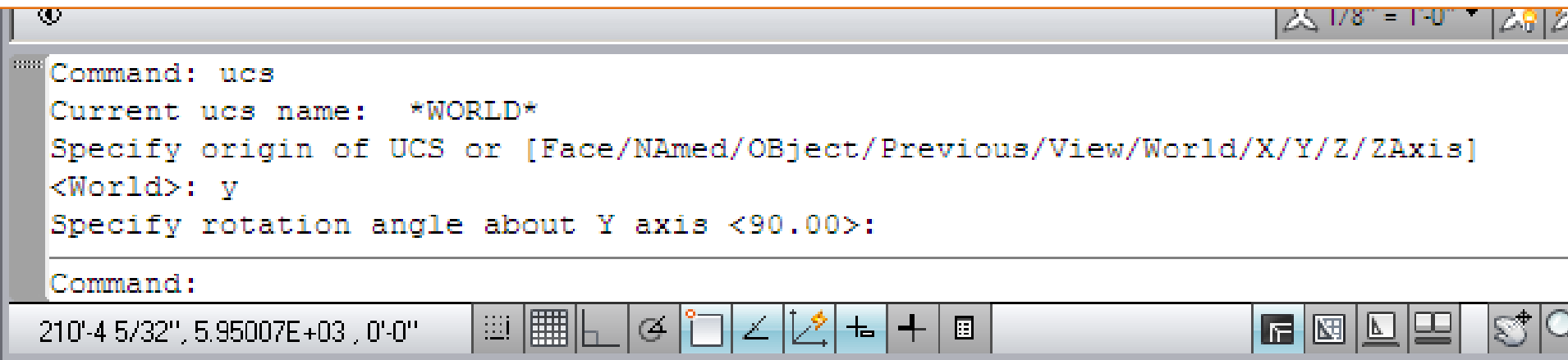


To understand the function of UCS, begin with a simple box and the rotate command, **RO**.

Rotate the box around the X-Axis, AutoCAD's preset.



WCS



The screenshot shows the AutoCAD command line interface. The command 'ucs' has been entered. The current UCS name is '*WORLD*'. The user is prompted to specify the origin of the UCS, and 'y' has been entered. The user is then prompted to specify the rotation angle about the Y axis, and '90.00' has been entered. The command line shows the coordinates of the origin: 210'-4 5/32", 5.95007E+03, 0'-0". The toolbar below the command line shows various icons, including the UCS icon.

```
Command: ucs
Current ucs name:  *WORLD*
Specify origin of UCS or [Face/NAmed/OBject/Previous/View/World/X/Y/Z/ZAxis]
<World>: y
Specify rotation angle about Y axis <90.00>:
Command:
210'-4 5/32", 5.95007E+03, 0'-0"
```

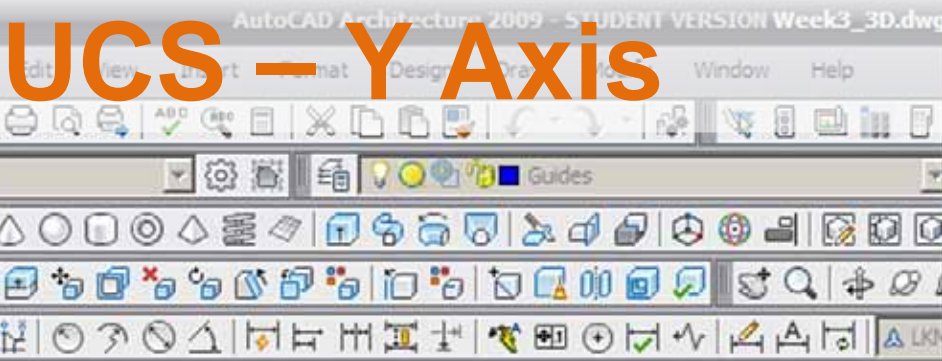
To change the UCS, activate the command:

UCS, Spacebar

Y (for Y-axis, according to the prompts), **Spacebar**

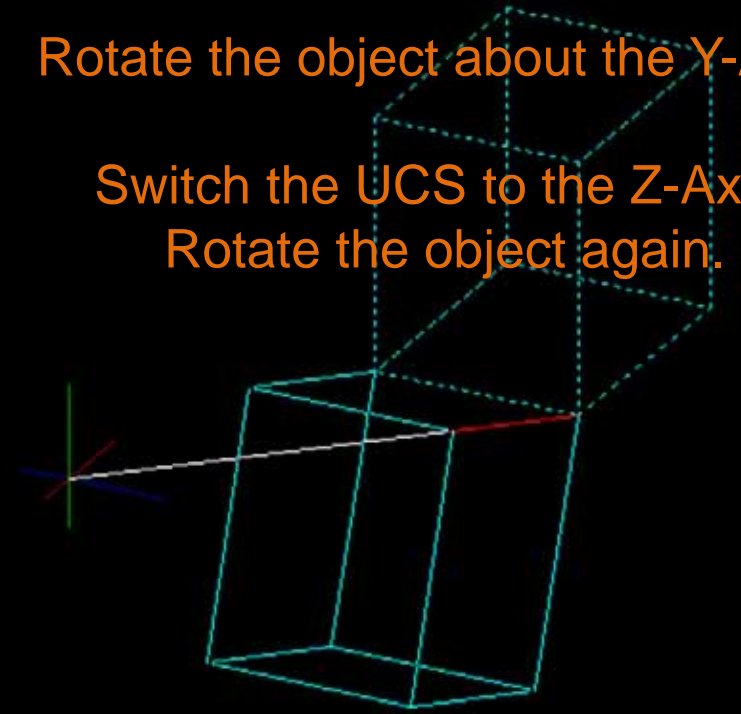
Spacebar again to accept a 90 degree rotation angle

UCS – Y Axis



Rotate the object about the Y-Axis.

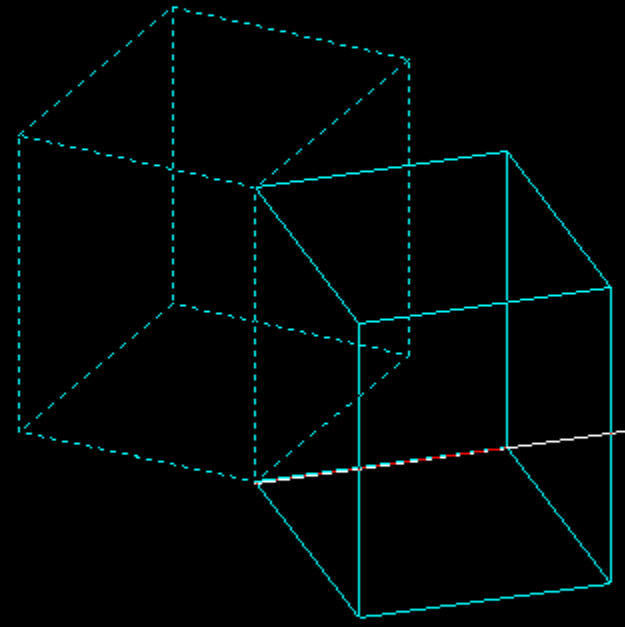
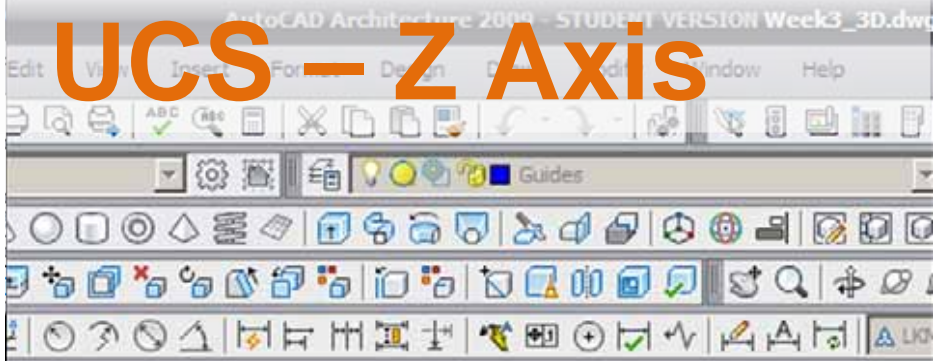
Switch the UCS to the Z-Axis.
Rotate the object again.



```
positive angle in UCS: ANGDIR=counterclockwise ANGBASE=0.00  
objects: 1 found  
objects:  
base point:  
rotation angle or [Copy/Reference] <0.00>:
```

3/4" 4'-3 1/8" , -3.34943E+03

UCS – Z Axis

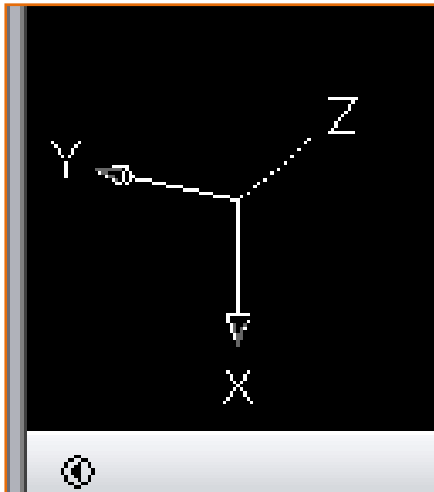


```
positive angle in UCS: ANGDIR=counterclockwise ANGBASE=0.00  
objects: 1 found  
objects:  
base point:  
rotation angle or [Copy/Reference] <0.00>:
```

3/4" 4'-3 1/8" , -3.34943E+03

RESET WCS

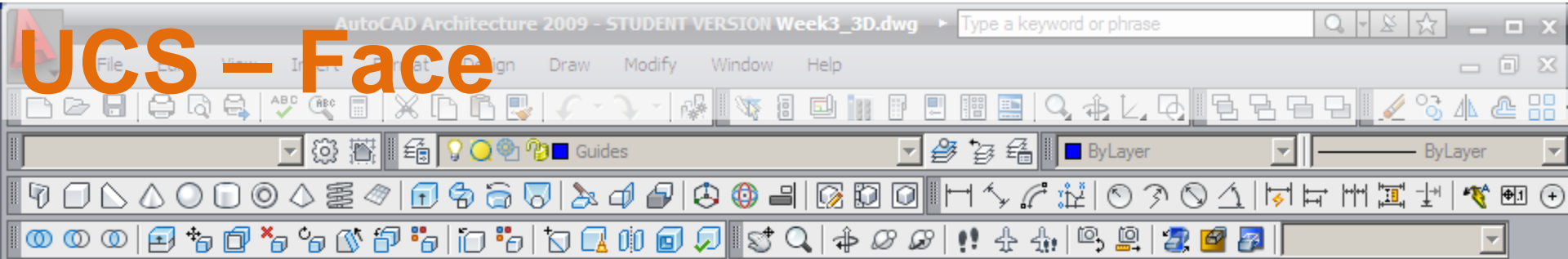
When switching between UCS settings, the coordinate system may need to be reset to the present World Coordinate System or WCS



To return to WCS, type **UCS**,
Spacebar, **W**.

```
Command: *Cancel*
Command: ucs
Current ucs name: *NO NAME*
Specify origin of UCS or [Face/NAMED/Object/Previous/View/World/X/Y/Z/ZAxis]
<World>: w
Command:
```

-4.96831E+03, 278'7 1/8" , 0'-0"

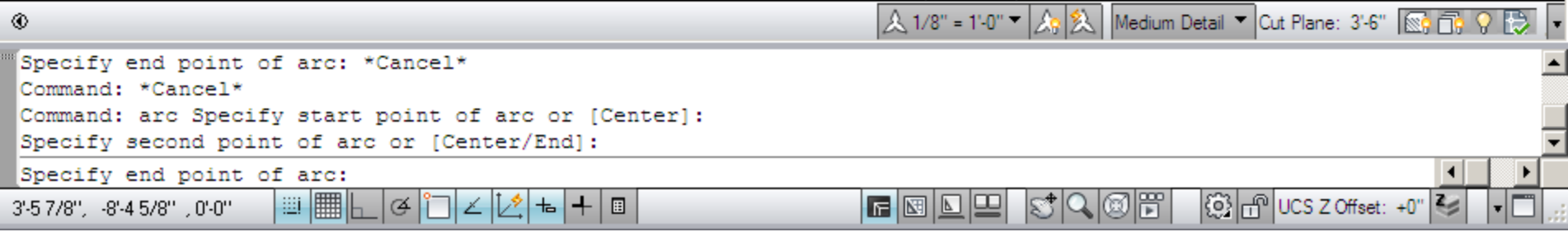
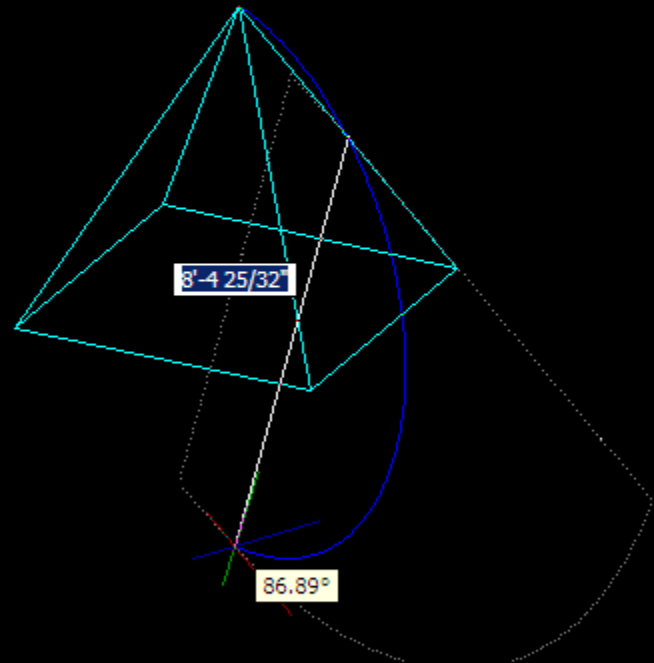


To set a non-orthogonal face as the drawing plane, type **UCS, Spacebar.**

F for Face.

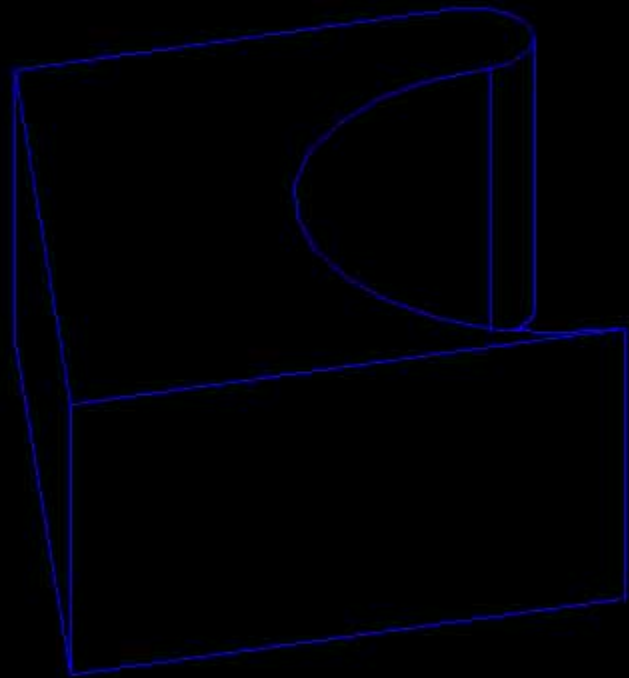
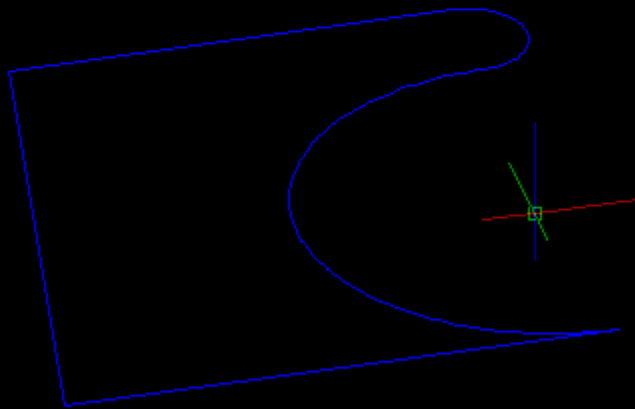
Then, use the tools to draw upon that face.

Return to WCS upon completion.
(WCS, Spacebar)



COMPLEX FORMS

Use the **pline** tool to create complex forms to extrude.



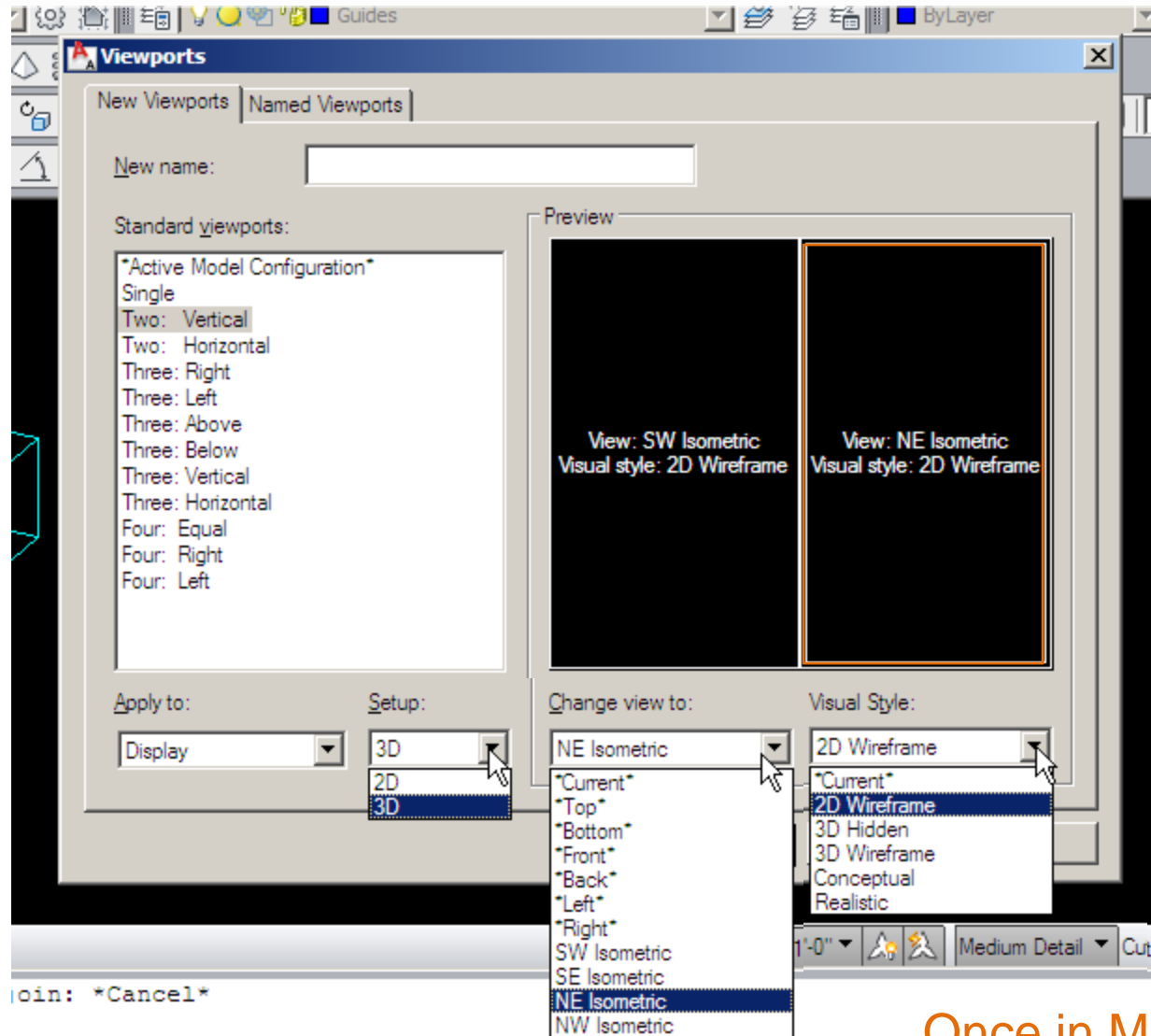
```
Specify base point or [Displacement] <Displacement>: Sp  
<use first point as displacement>:  
Command: p PAN  
Press ESC or ENTER to exit, or right-click to display s  
Command:
```

-4.42775E+03, 305'9 3/16", 0'-0"

```
Specify height of extrusion or [Direction/Path/Taper angle]  
Erase defining objects? [Yes/No] <Yes>: n  
Command: *Cancel*  
Command: hide Regenerating model.  
Command:
```

-4.34669E+03, 3.68244E+03, 0'-0"

VIEWPORTS IN MODEL SPACE

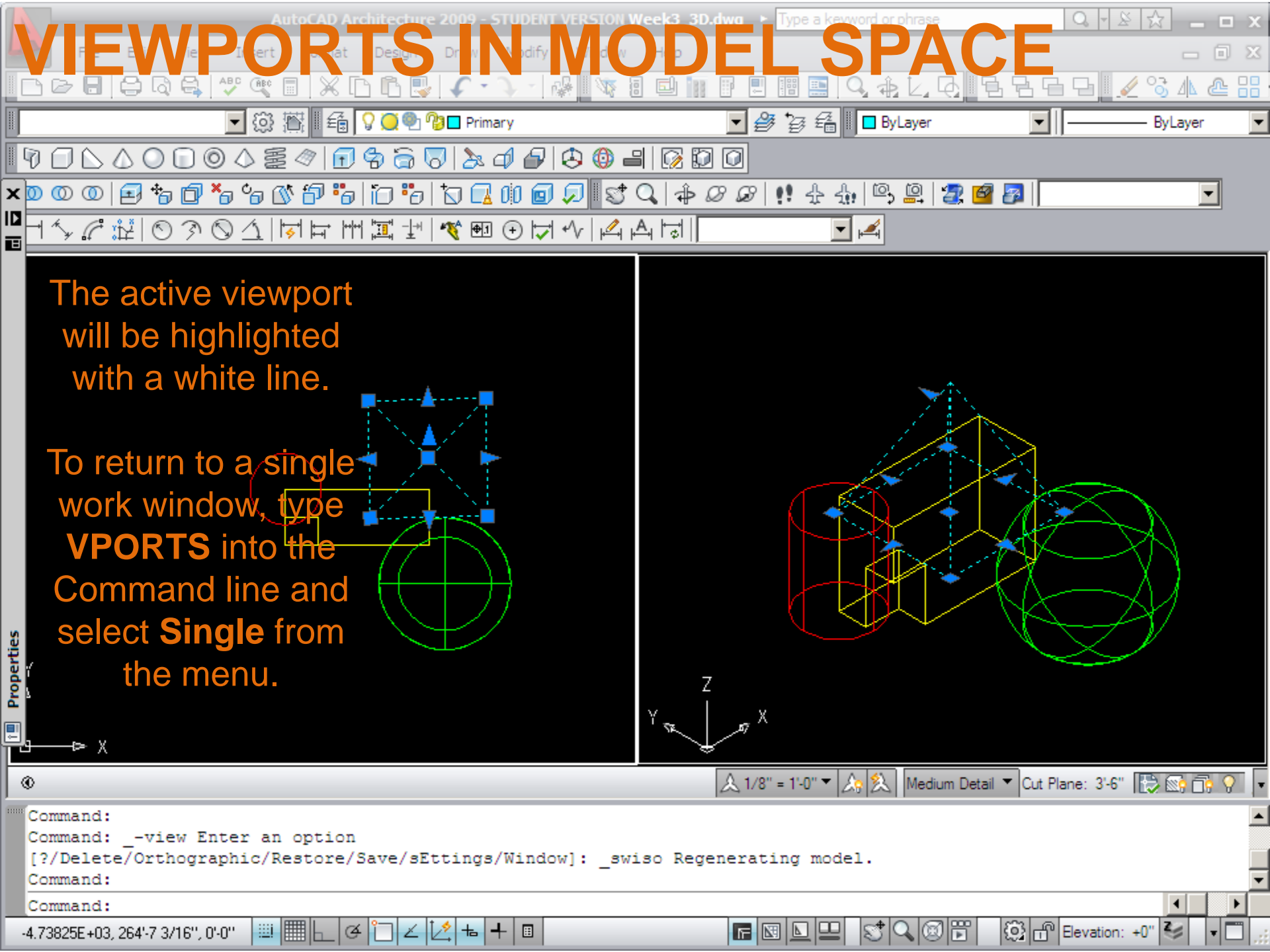


Viewports can be useful in Model Space by providing multiple views of your model while it's being worked on.

Access the Viewports window:
VPORTS, Spacebar.

Select the viewport in the screen to the right and then select its attributes.

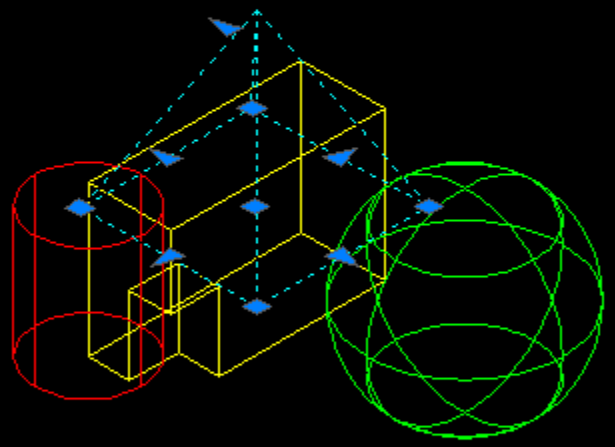
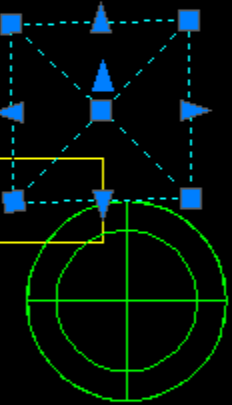
Once in Model Space you'll also be able to make changes to the view direction and visual style.



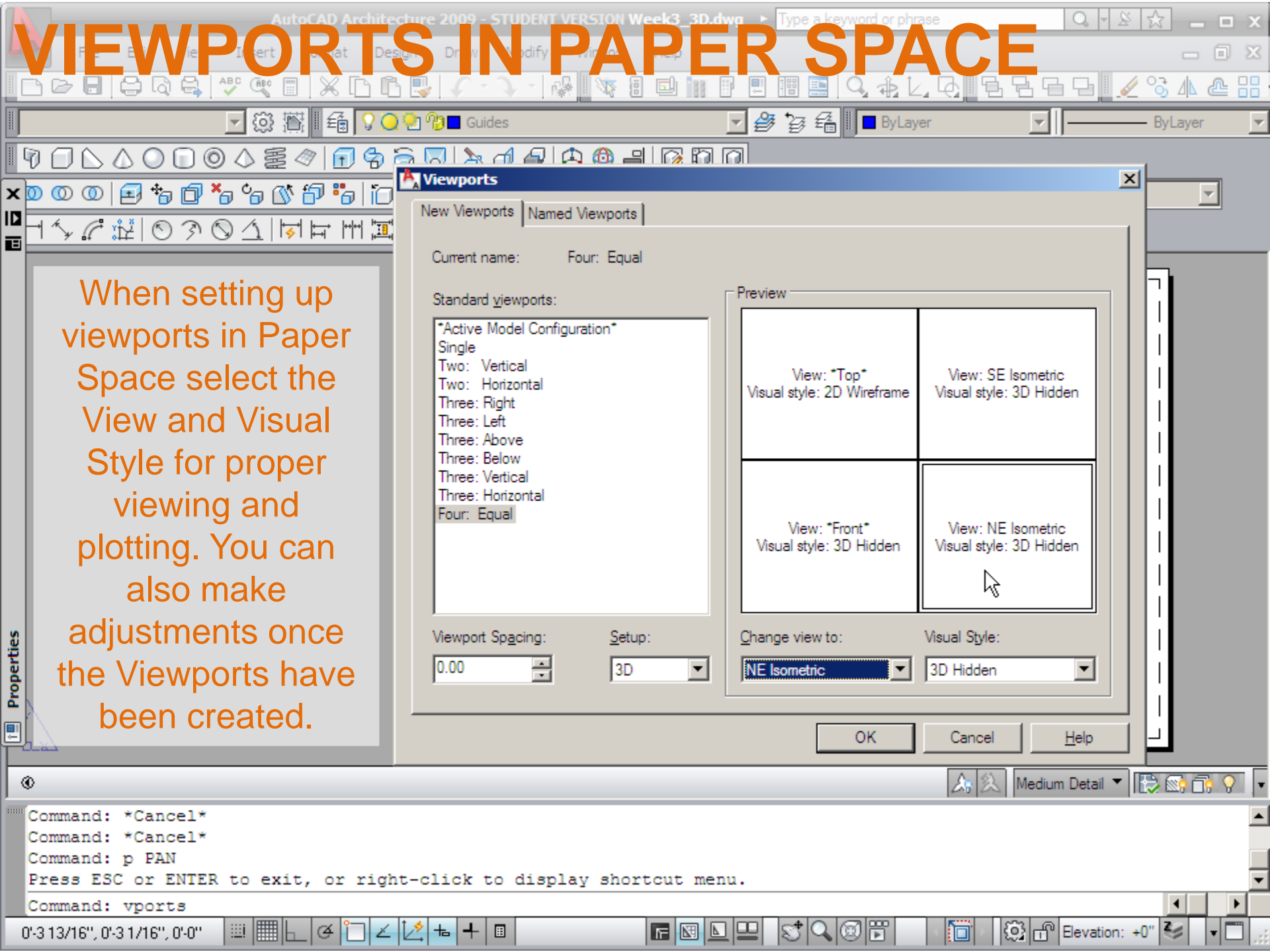
VIEWPORTS IN MODEL SPACE

The active viewport will be highlighted with a white line.

To return to a single work window, type **VPORTS** into the Command line and select **Single** from the menu.



```
Command:  
Command: _view Enter an option  
[?/Delete/Orthographic/Restore/Save/sEttings/Window]: _swiso Regenerating model.  
Command:  
Command:
```



VIEWPORTS IN PAPER SPACE

When setting up viewports in Paper Space select the View and Visual Style for proper viewing and plotting. You can also make adjustments once the Viewports have been created.

Viewports

New Viewports | Named Viewports

Current name: Four: Equal

Standard viewports:

- *Active Model Configuration*
- Single
- Two: Vertical
- Two: Horizontal
- Three: Right
- Three: Left
- Three: Above
- Three: Below
- Three: Vertical
- Three: Horizontal
- Four: Equal

Viewport Spacing: 0.00 | Setup: 3D

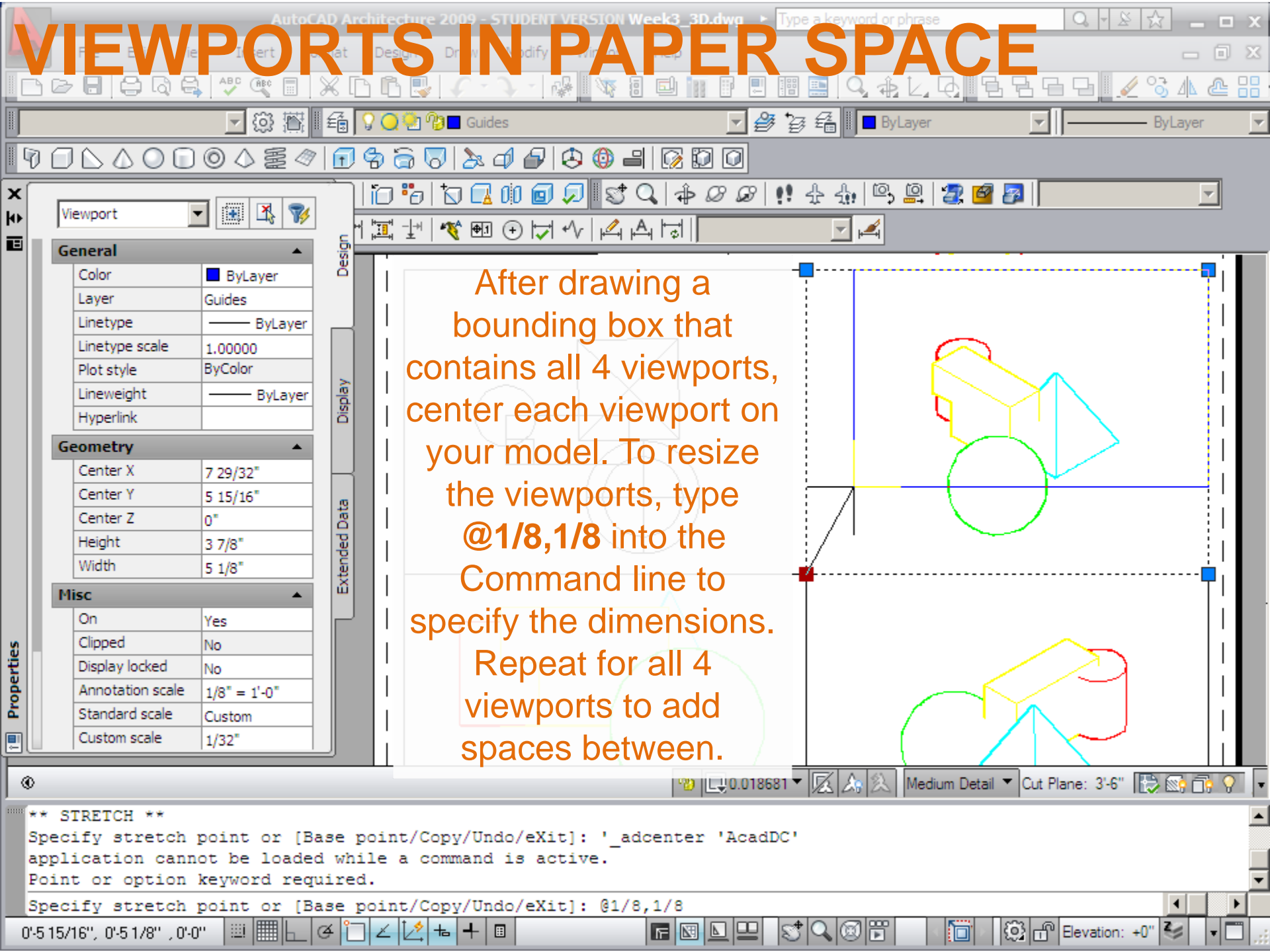
Preview

View: *Top* Visual style: 2D Wireframe	View: SE Isometric Visual style: 3D Hidden
View: *Front* Visual style: 3D Hidden	View: NE Isometric Visual style: 3D Hidden

Change view to: NE Isometric | Visual Style: 3D Hidden

OK | Cancel | Help

Command: *Cancel*
Command: *Cancel*
Command: p PAN
Press ESC or ENTER to exit, or right-click to display shortcut menu.
Command: vports



VIEWPORTS IN PAPER SPACE

After drawing a bounding box that contains all 4 viewports, center each viewport on your model. To resize the viewports, type @1/8,1/8 into the Command line to specify the dimensions. Repeat for all 4 viewports to add spaces between.

Viewport

General

Color	ByLayer
Layer	Guides
Linetype	ByLayer
Linetype scale	1.00000
Plot style	ByColor
Lineweight	ByLayer
Hyperlink	

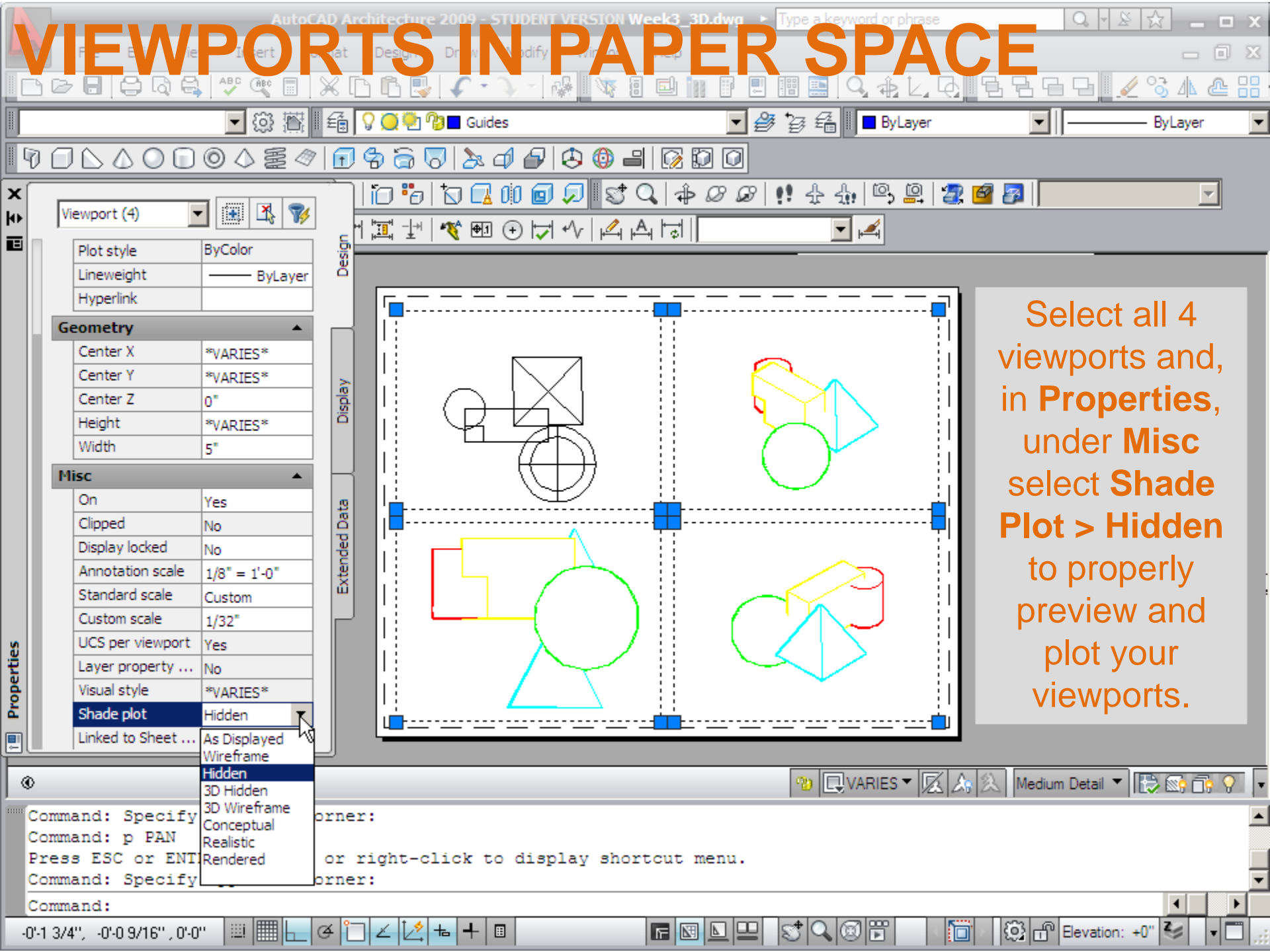
Geometry

Center X	7 29/32"
Center Y	5 15/16"
Center Z	0"
Height	3 7/8"
Width	5 1/8"

Misc

On	Yes
Clipped	No
Display locked	No
Annotation scale	1/8" = 1'-0"
Standard scale	Custom
Custom scale	1/32"

```
** STRETCH **  
Specify stretch point or [Base point/Copy/Undo/eXit]: '_adcenter 'AcadDC'  
application cannot be loaded while a command is active.  
Point or option keyword required.  
Specify stretch point or [Base point/Copy/Undo/eXit]: @1/8,1/8
```



VIEWPORTS IN PAPER SPACE

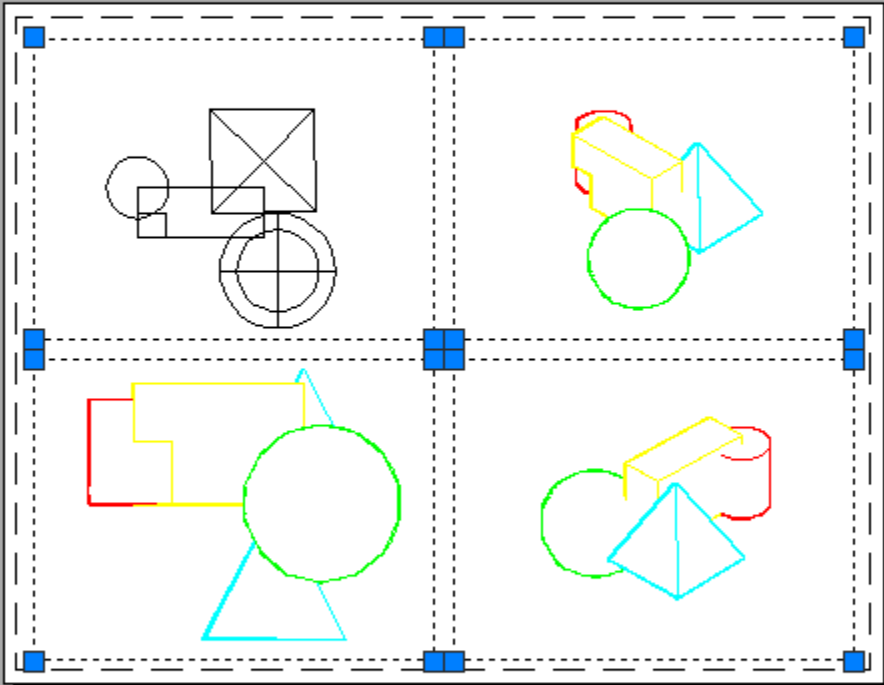
Viewport (4)

Plot style	ByColor
Lineweight	ByLayer
Hyperlink	

Geometry	
Center X	*VARIES*
Center Y	*VARIES*
Center Z	0"
Height	*VARIES*
Width	5"

Misc	
On	Yes
Clipped	No
Display locked	No
Annotation scale	1/8" = 1'-0"
Standard scale	Custom
Custom scale	1/32"
UCS per viewport	Yes
Layer property ...	No
Visual style	*VARIES*
Shade plot	Hidden
Linked to Sheet ...	As Displayed

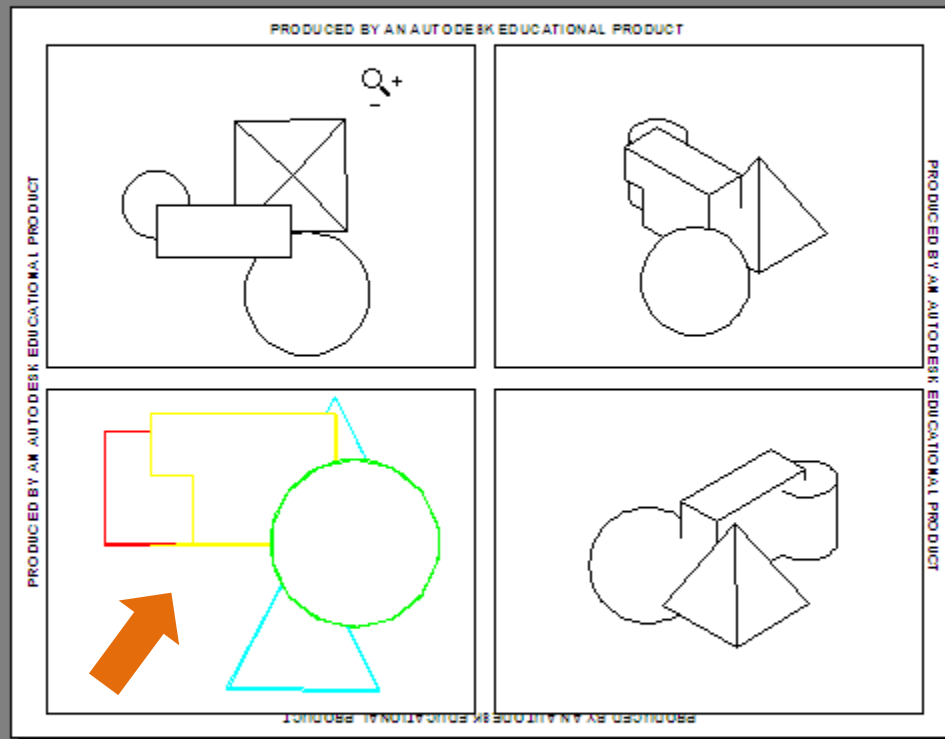
- Wireframe
- Hidden
- 3D Hidden
- 3D Wireframe
- Conceptual
- Realistic
- Rendered



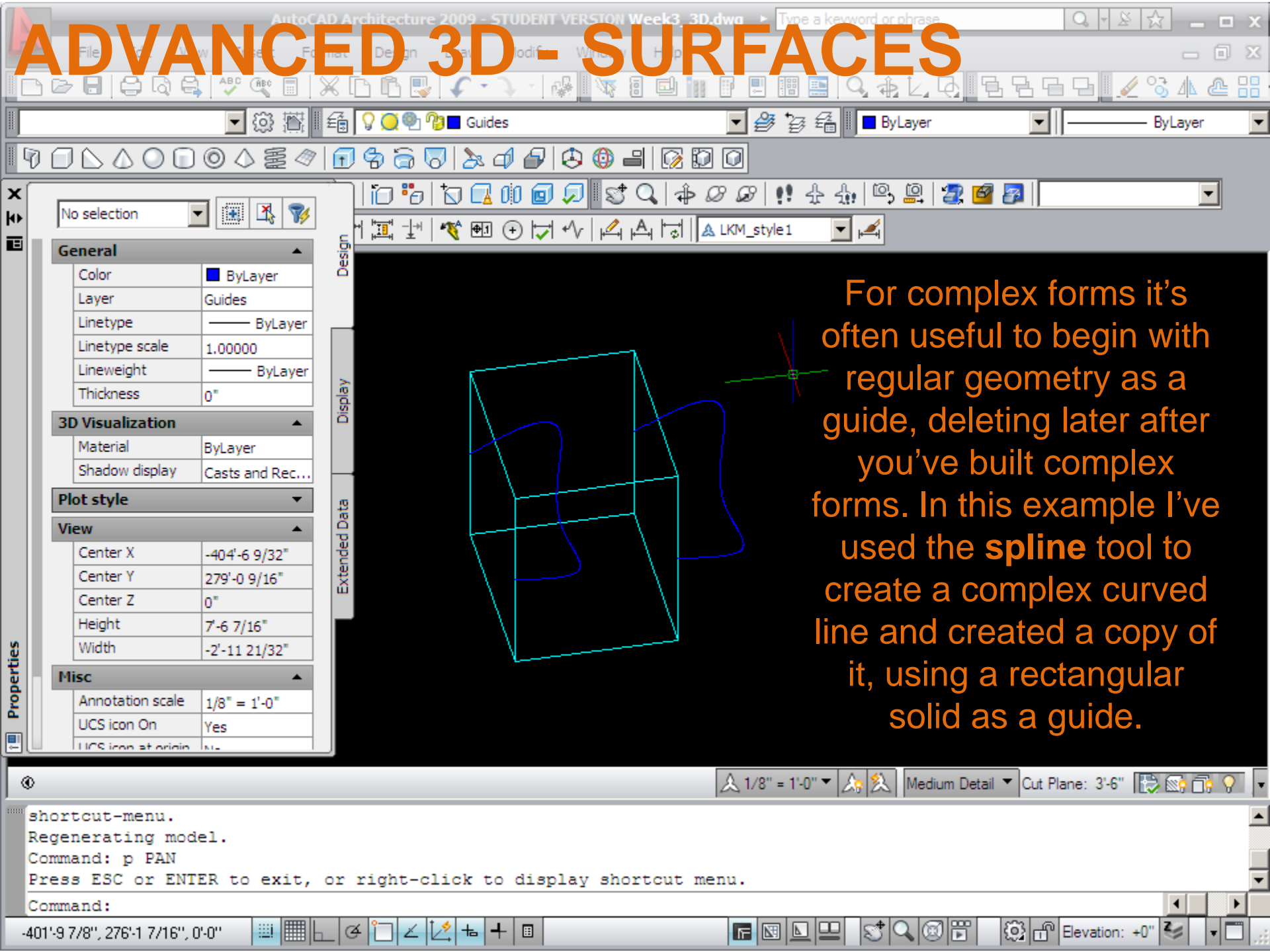
Select all 4 viewports and, in **Properties**, under **Misc** select **Shade Plot > Hidden** to properly preview and plot your viewports.

Command: Specify corner:
Command: p PAN
Press ESC or ENT
Command: Specify corner:
Command:

VIEWPORTS IN PAPER SPACE



If the previous step *is not done* your preview will look like the lower left viewport whose Shade Plot is set at “As Displayed”. Return to Paper Space and select **Shade Plot > Hidden** from the Properties window.

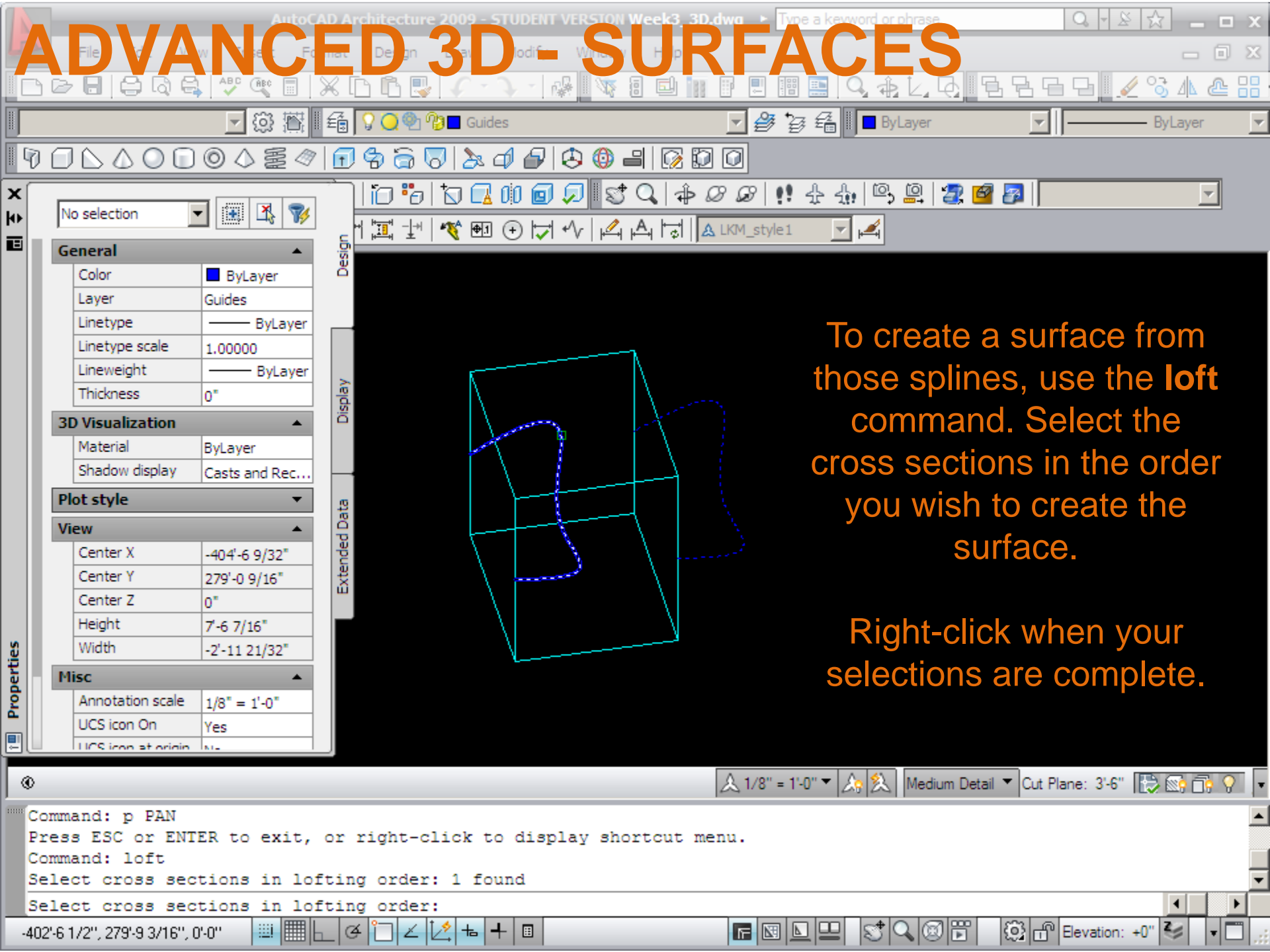


ADVANCED 3D - SURFACES

No selection	
General	
Color	ByLayer
Layer	Guides
Linetype	ByLayer
Linetype scale	1.00000
Lineweight	ByLayer
Thickness	0"
3D Visualization	
Material	ByLayer
Shadow display	Casts and Rec...
Plot style	
View	
Center X	-404'-6 9/32"
Center Y	279'-0 9/16"
Center Z	0"
Height	7'-6 7/16"
Width	-2'-11 21/32"
Misc	
Annotation scale	1/8" = 1'-0"
UCS icon On	Yes
UCS icon at origin	No

For complex forms it's often useful to begin with regular geometry as a guide, deleting later after you've built complex forms. In this example I've used the **spline** tool to create a complex curved line and created a copy of it, using a rectangular solid as a guide.

```
shortcut-menu.  
Regenerating model.  
Command: p PAN  
Press ESC or ENTER to exit, or right-click to display shortcut menu.  
Command:  
-401'-9 7/8", 276'-1 7/16", 0'-0"
```



ADVANCED 3D - SURFACES

To create a surface from those splines, use the **loft** command. Select the cross sections in the order you wish to create the surface.

Right-click when your selections are complete.

General	
Color	ByLayer
Layer	Guides
Linetype	ByLayer
Linetype scale	1.00000
Lineweight	ByLayer
Thickness	0"

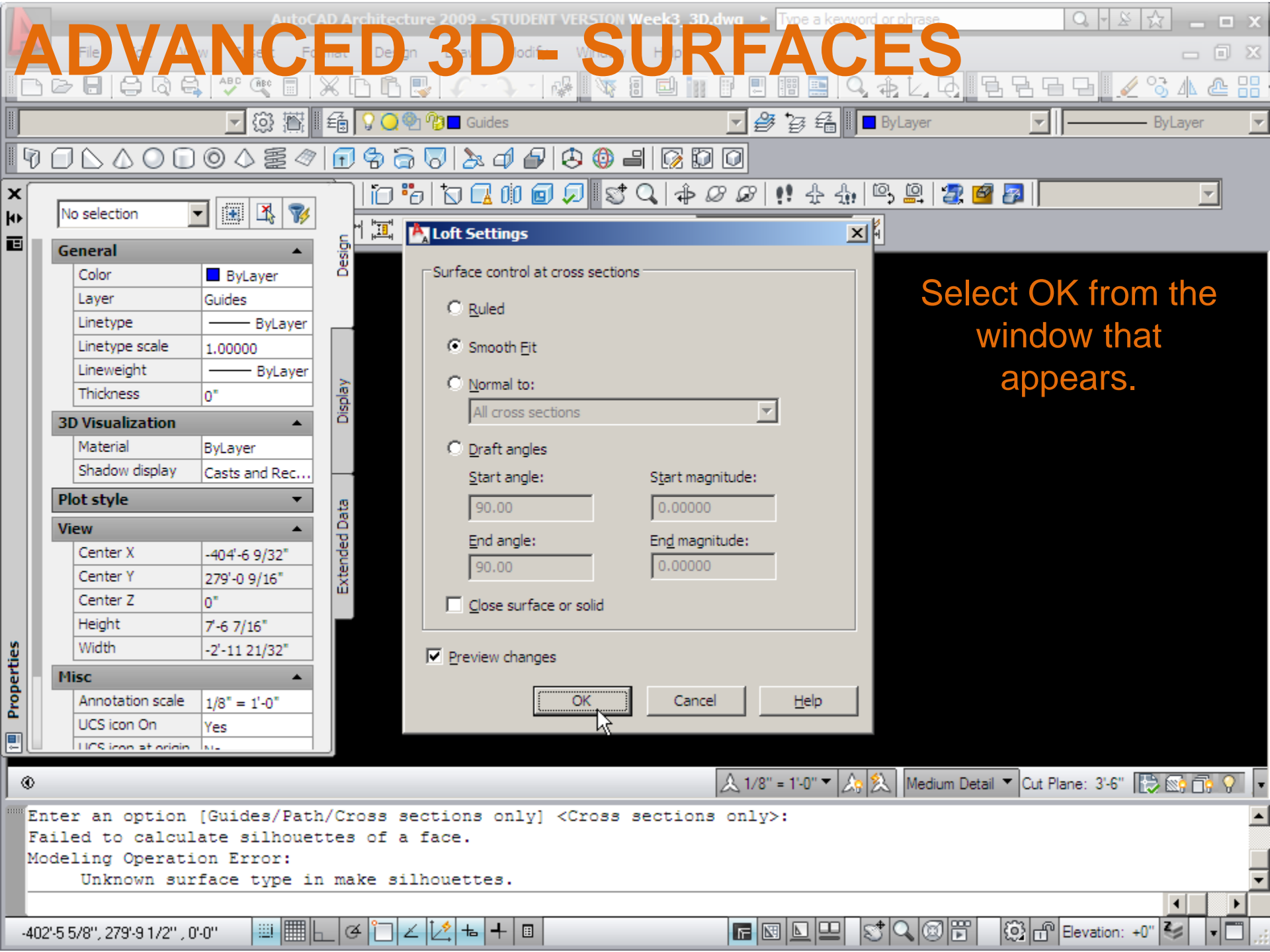
3D Visualization	
Material	ByLayer
Shadow display	Casts and Rec...

Plot style	
[Dropdown]	

View	
Center X	-404'-6 9/32"
Center Y	279'-0 9/16"
Center Z	0"
Height	7'-6 7/16"
Width	-2'-11 21/32"

Misc	
Annotation scale	1/8" = 1'-0"
UCS icon On	Yes
UCS icon at origin	No

```
Command: p PAN
Press ESC or ENTER to exit, or right-click to display shortcut menu.
Command: loft
Select cross sections in lofting order: 1 found
Select cross sections in lofting order:
```

ADVANCED 3D - SURFACES

Select OK from the window that appears.

Loft Settings

Surface control at cross sections

- Ruled
- Smooth Fit
- Normal to:
All cross sections
- Draft angles
Start angle: 90.00 Start magnitude: 0.00000
End angle: 90.00 End magnitude: 0.00000

Close surface or solid

Preview changes

OK Cancel Help

No selection

General

Color	ByLayer
Layer	Guides
Linetype	ByLayer
Linetype scale	1.00000
Lineweight	ByLayer
Thickness	0"

3D Visualization

Material	ByLayer
Shadow display	Casts and Rec...

Plot style

View

Center X	-404'-6 9/32"
Center Y	279'-0 9/16"
Center Z	0"
Height	7'-6 7/16"
Width	-2'-11 21/32"

Misc

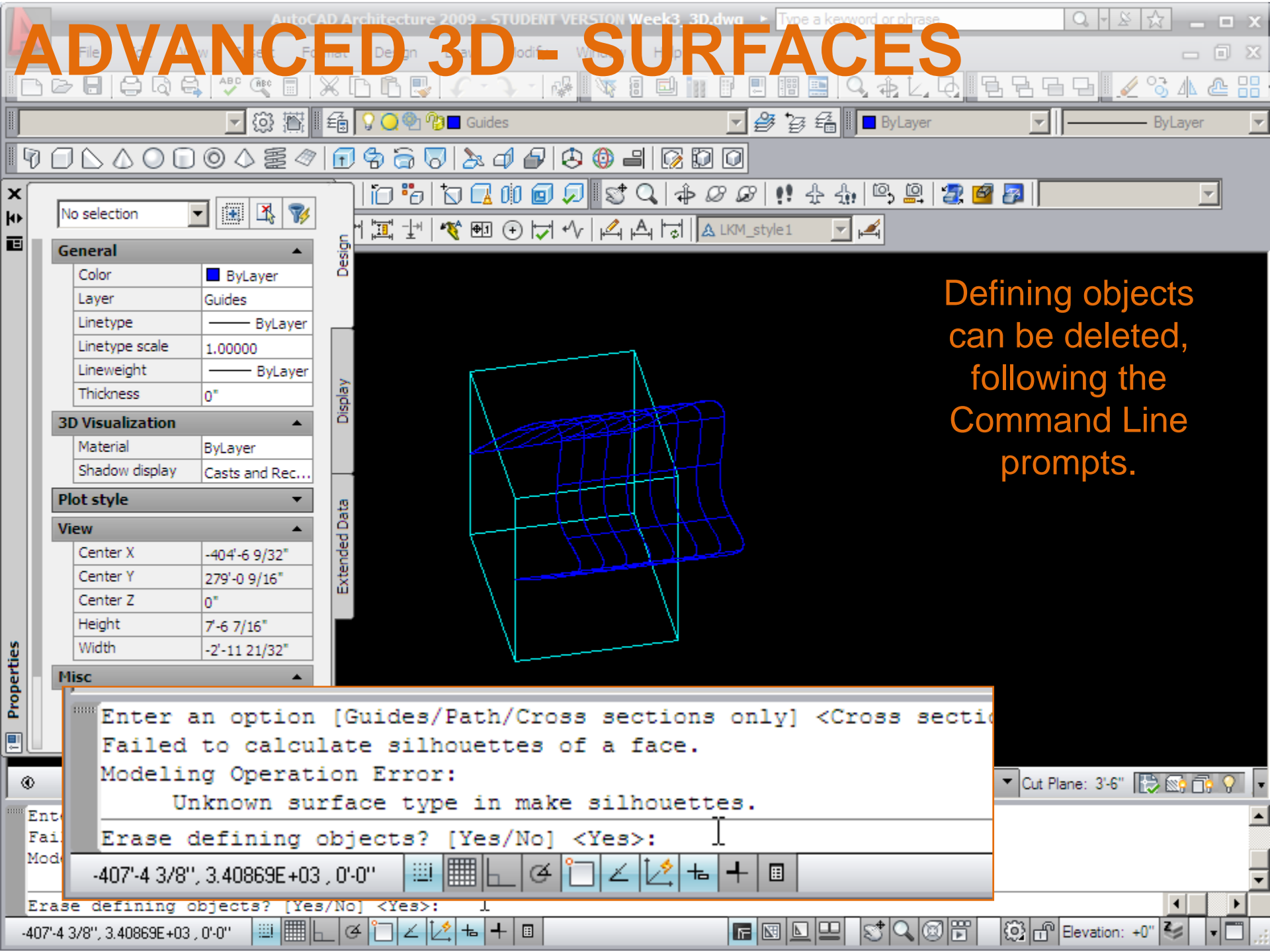
Annotation scale	1/8" = 1'-0"
UCS icon On	Yes
UCS icon at origin	No

Enter an option [Guides/Path/Cross sections only] <Cross sections only>:
Failed to calculate silhouettes of a face.
Modeling Operation Error:
Unknown surface type in make silhouettes.

-402'-5 5/8", 279'-9 1/2", 0'-0"

Elevation: +0"

ADVANCED 3D - SURFACES



Defining objects can be deleted, following the Command Line prompts.

File Edit View Insert Format Design Draw Modify Window Help



Guides ByLayer ByLayer



No selection

General

Color	ByLayer
Layer	Guides
Linetype	ByLayer
Linetype scale	1.00000
Lineweight	ByLayer
Thickness	0"

3D Visualization

Material	ByLayer
Shadow display	Casts and Rec...

Plot style

View

Center X	-407'-10 5/8"
Center Y	277'-10 3/8"
Center Z	0"
Height	4'-10 1/16"
Width	-1119'-8 11/16"

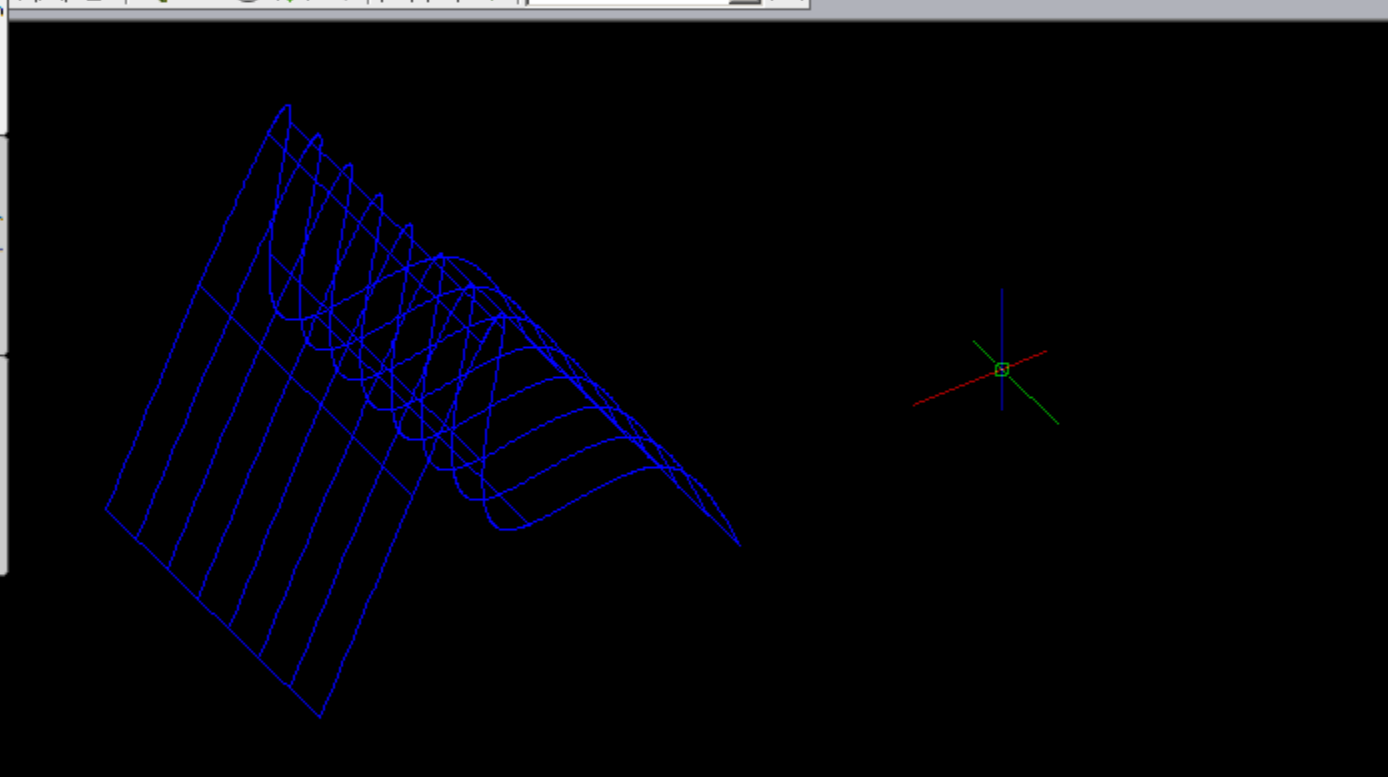
Misc

Annotation scale	1/8" = 1'-0"
UCS icon On	Yes
UCS icon at origin	No

Design
Display
Extended Data



LKM_style1



1/8" = 1'-0" Medium Detail Cut Plane: 3'-6"

Modeling Operation Error:

Unknown surface type in make silhouettes.

Command: p PAN

Press ESC or ENTER to exit, or right-click to display shortcut menu.

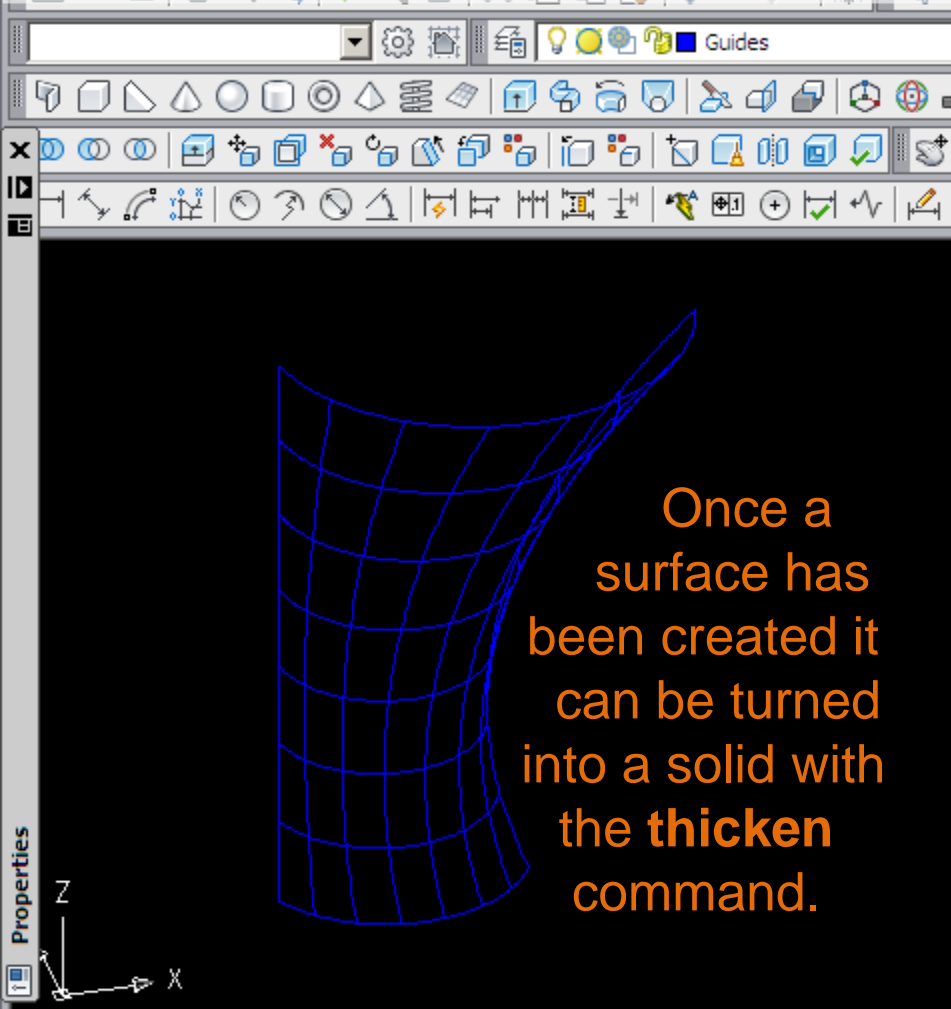
Command:

-4.93281E+03, 279'-5 7/16", 0'-0"



Elevation: +0"

ADVANCED 3D – SOLID



Once a surface has been created it can be turned into a solid with the **thicken** command.

