AutoCAD Lab 3

Geometric Constructions
and
Template Drawings

EGS 1007

Engineering Concepts and Methods

AutoCAD Construction

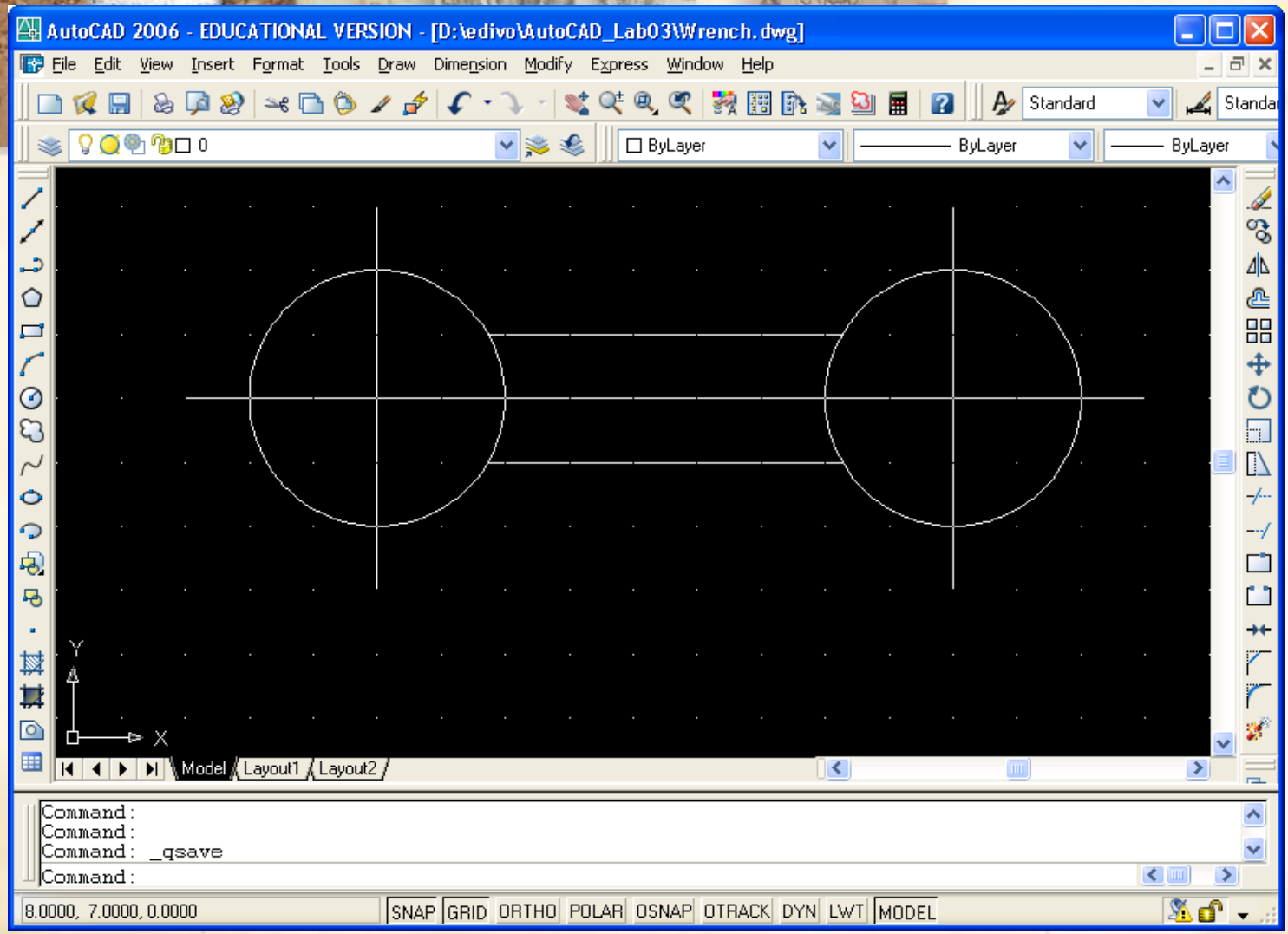
- **Open AutoCAD.**
- **From the pull-down menu: click on *File* -> *New* and double-click on the acad.dwt default template.**
- **Set the upper right corner limits to *12.0,9.0*, turn ON the SNAP and GRID with spacing of *0.5*.**
- **ZOOM ALL**
- **Turn OFF OSNAP, POLAR, and OTRACK.**
- **Save the drawing in your working directory as wrench.dwg.**

AutoCAD Construction

Draw the base of the wrench:

- Draw a horizontal line *7.5* units long (15 grid points) near the middle of the screen. (*line, click, @7.5<0*)
- Draw two vertical lines 3 units long and 4.5 units away from each other. Center them vertically and horizontally with the first line.
- Draw two circles centered at the line *intersections* with 1 unit radii.
- Copy or offset the horizontal line 0.5 units up and 0.5 units down.
- Turn off SNAP
- Trim the new lines with the circles as cutting edges.

AutoCAD Construction

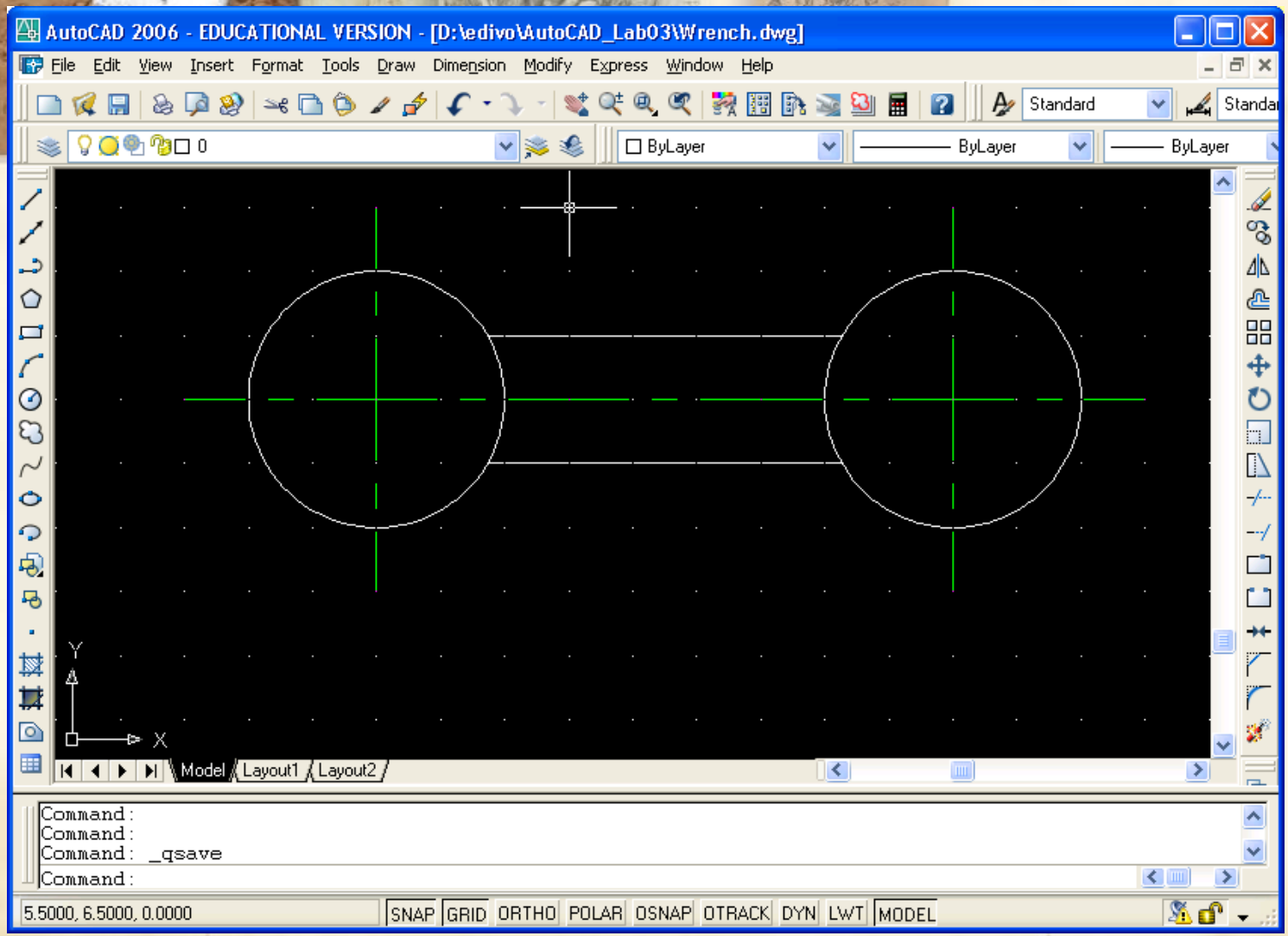


AutoCAD Construction

Add layers:

- Go to the layer control dialog box (*Layer Properties Manager*) and add a layer called *CENTERLINES*.
- Change the *linetype* for this layer to *CENTER*.
- Change the color for this layer to *GREEN*.
- Move the first three lines from layer 0 to layer *CENTERLINES*.
- Modify the *linetype* scale (type LTSCALE) to 0.75 units to visualize the center lines properly.

AutoCAD Construction

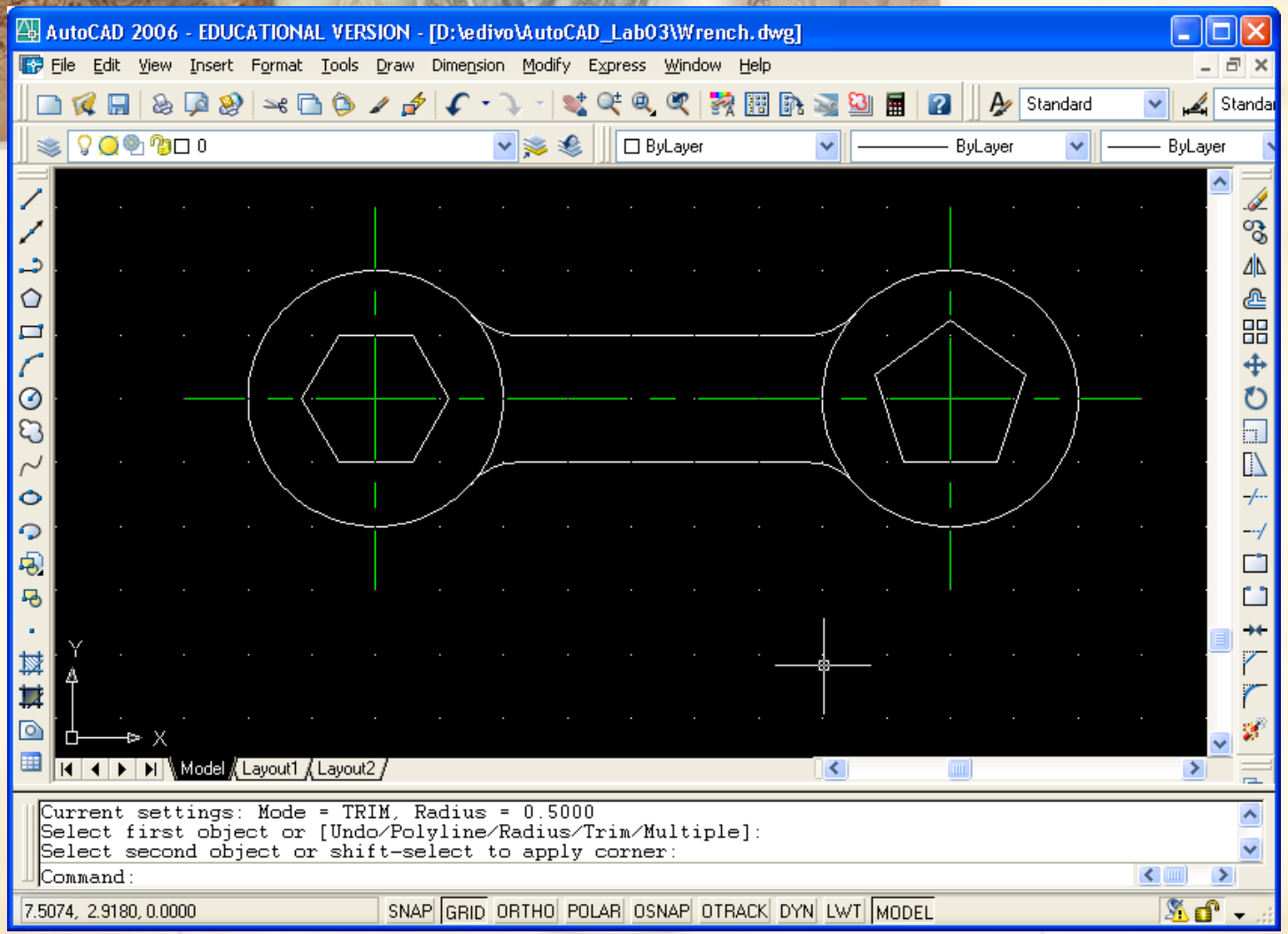


AutoCAD Construction

Add polygons:

- Fillet the handle intersections with a *radius* of *0.5* units.
- Make sure SNAP is back on…
- On layer 0, type *polygon*, enter 5 sides (*pentagon*), select the *center point* as the *right-hand-side intersection*, and select the option of *circumscribing* the polygon on a circle of *radius 0.5*. Make sure the pentagon appears with the vertex pointing upwards.
- Type *polygon*, enter 6 sides (*hexagon*), select the *center point* as the *left-hand-side intersection*, and select the option of *circumscribing* on a circle of *radius 0.5*.

AutoCAD Construction

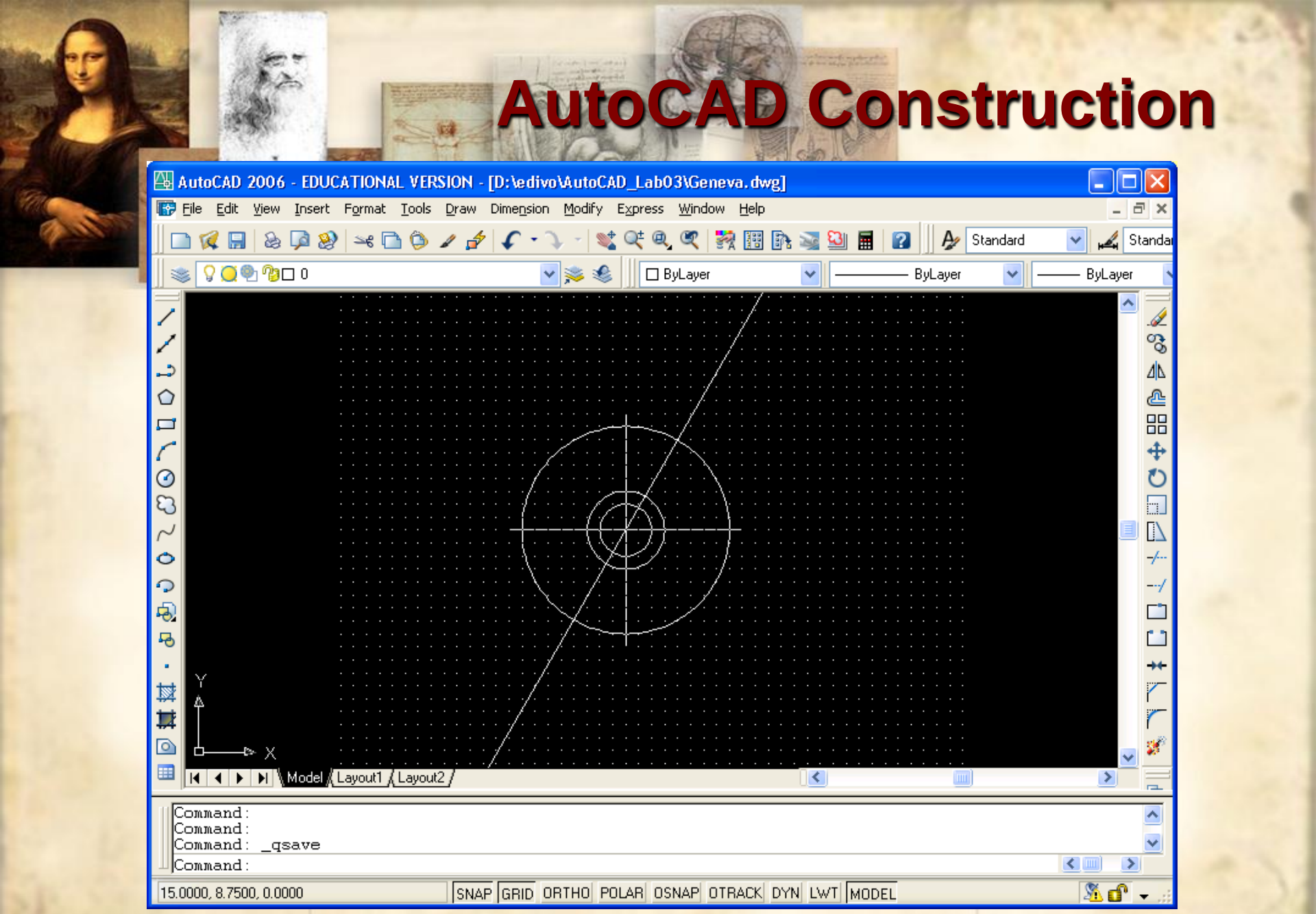


AutoCAD Construction

Create a new drawing:

- **Save** and **close** the current drawing. **Select** a new drawing from the standard template (***acad.dwt***)
- **Set** upper right corner **limits** to ***12.0,9.0***
- **Set** the **SNAP** and **GRID** to **0.25** and **save** your new drawing as ***geneva.dwg***. (Geneva cam)
- http://www.cabaret.co.uk/education/hints-and-tips/geneva-wheel-animation/
- Turn on **GRID** and then **ZOOM** ALL
- **Draw** 3 **concentric circles** of diameters of **1**, **1.5**, and **4 units**, centered at **5.5**, **4.5 (X,Y)**. (***c -> 5.5,4.5 ; d -> 1 … etc***)
- Draw two ***center lines*** and extend them **0.25** units outside the circles.
- **Draw** a **construction line** (***XLine***) at **60 degrees** going through the center.

AutoCAD Construction

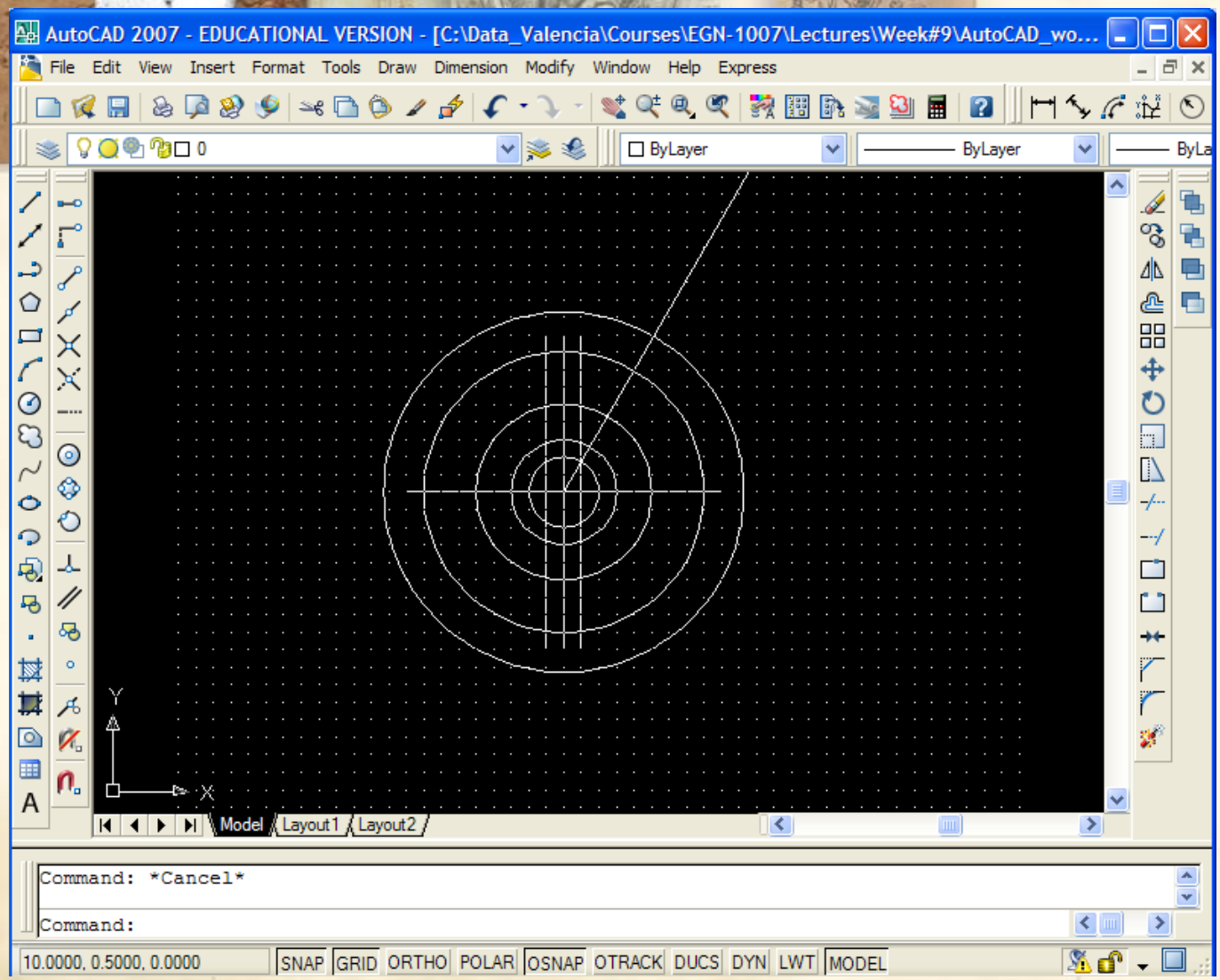


AutoCAD Construction

Adding elements:

- Offset the *vertical line 0.25* units to the left and right.
- Trim the *construction line* so it only extends *upwards* from the *center point*.
- Turn ON *OSNAP* with ***center*** and ***intersection*** modes.
- Create two concentric circles with radii ***2.57*** and ***1.25***.
- ZOOM ALL
- Then ZOOM WINDOW around drawing…

AutoCAD Construction

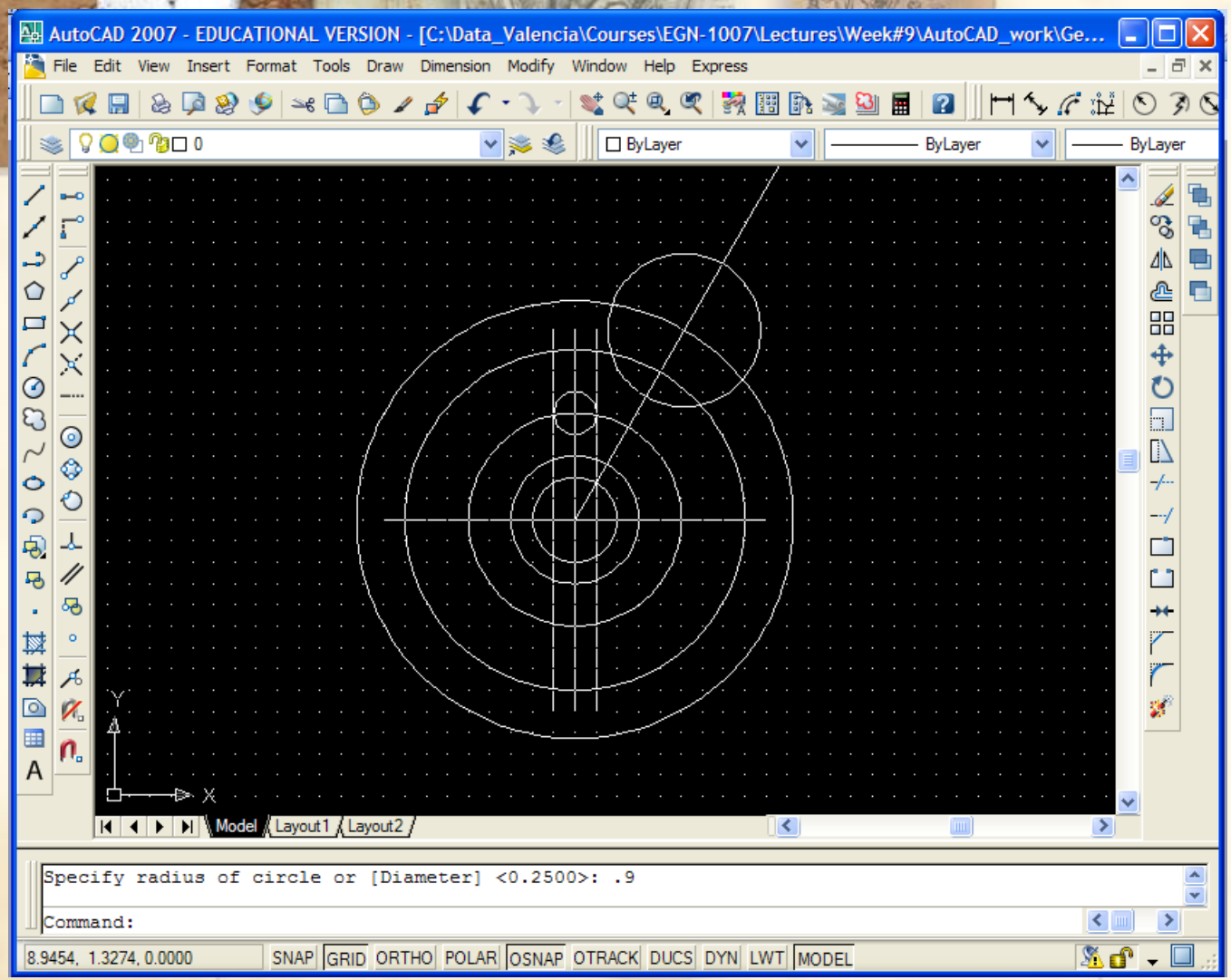


AutoCAD Construction

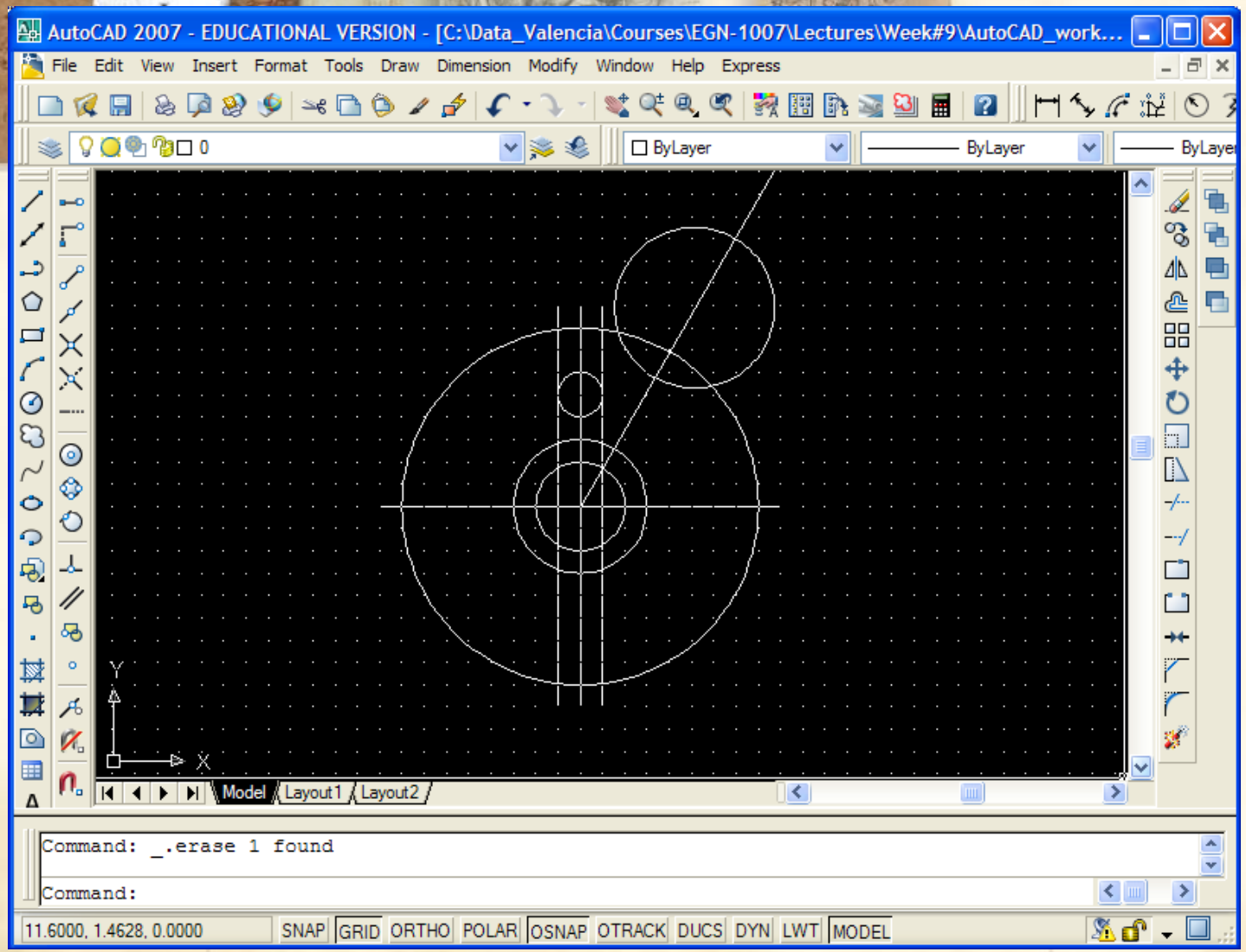
Adding elements:

- Turn SNAP off
- Draw a small circle of radius ***0.25*** at the ***intersection*** of the vertical line and the new circle of radius ***1.25***.
- Use Tools/Inquiry/Distance if not sure which circle to use…
- Draw a circle of radius ***0.9*** at the ***intersection*** of the construction line and the new circle of radius ***2.57***.
- Trim and erase objects to look as follows.

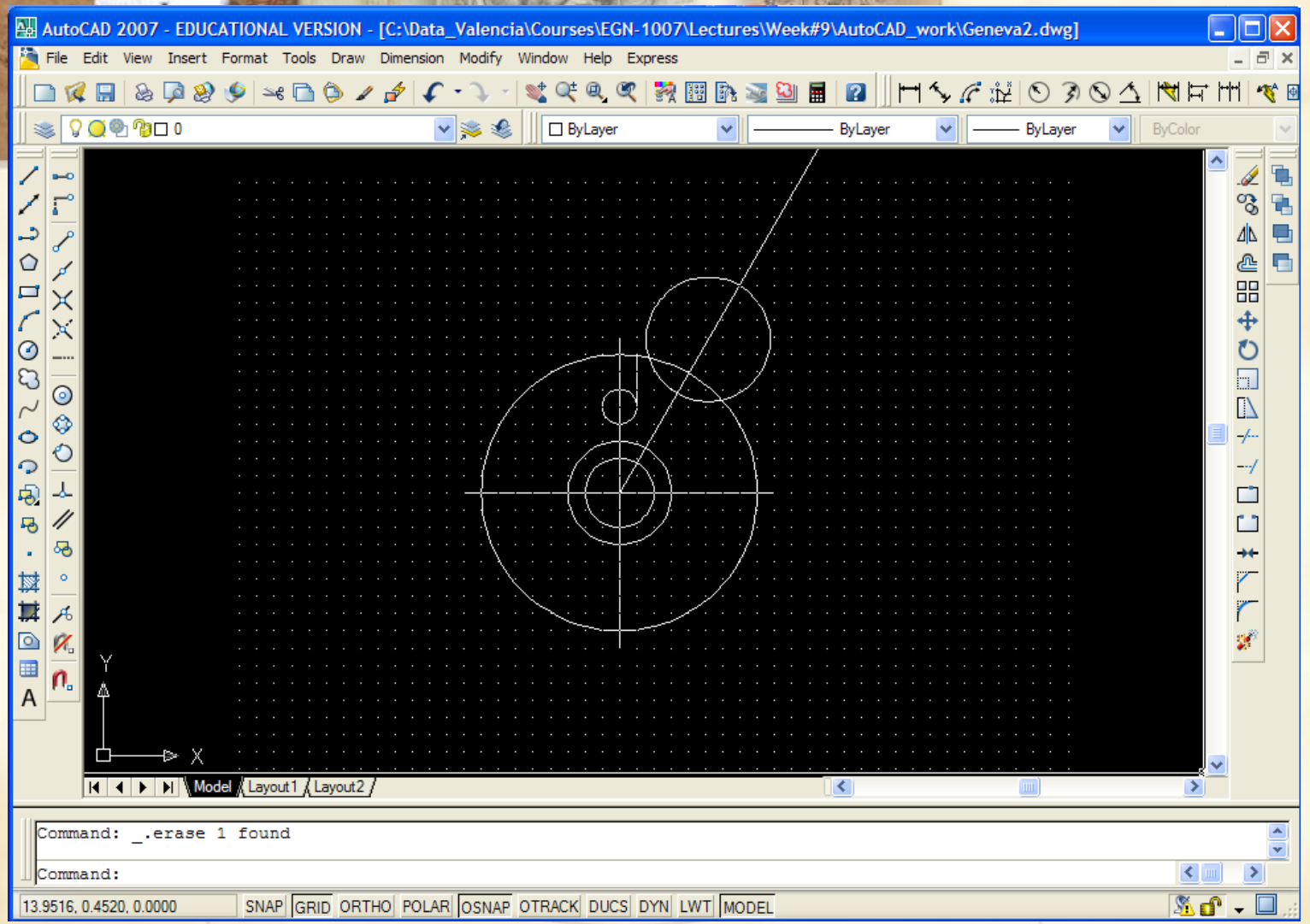
AutoCAD Construction



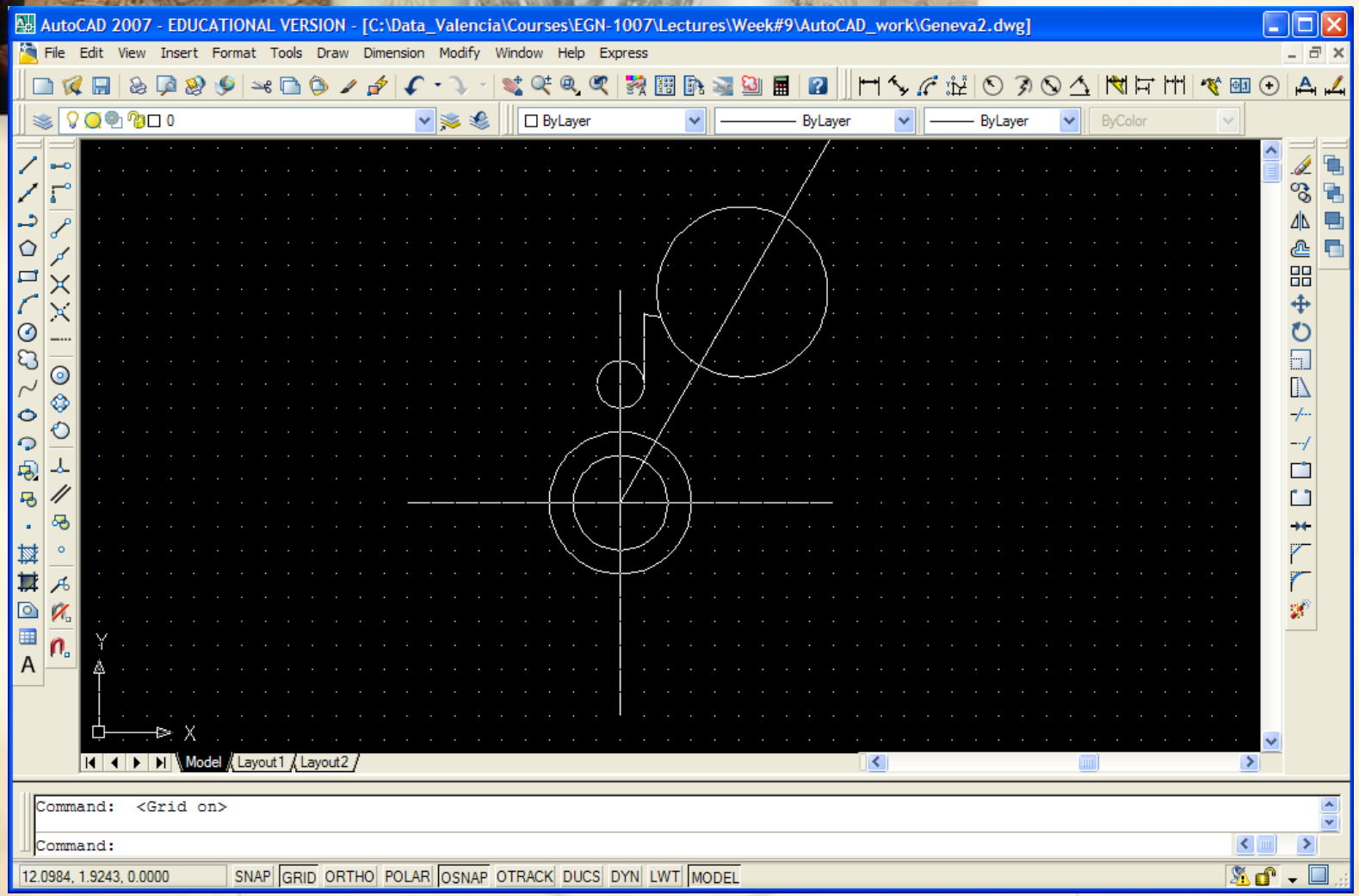
AutoCAD Construction



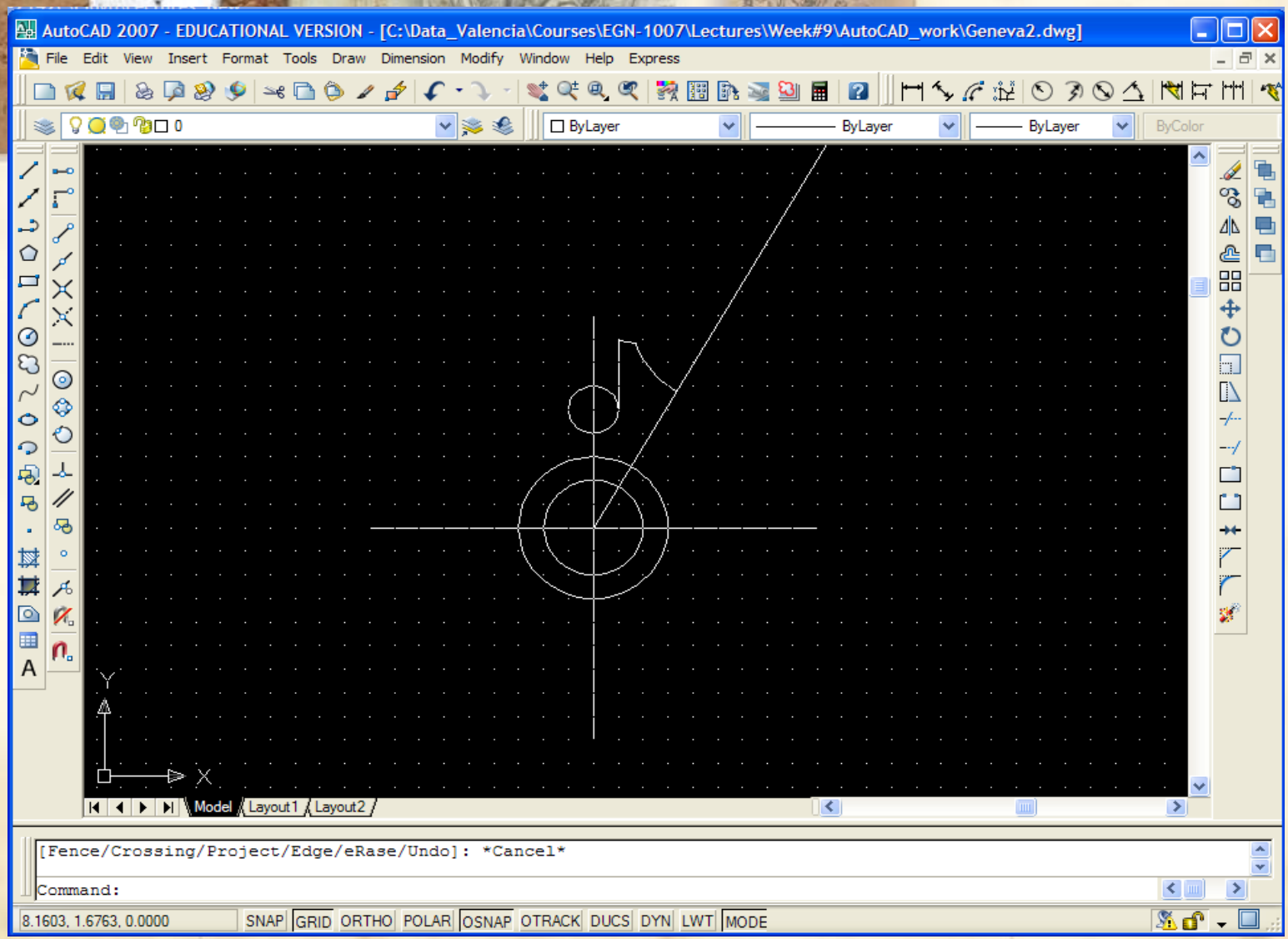
AutoCAD Construction



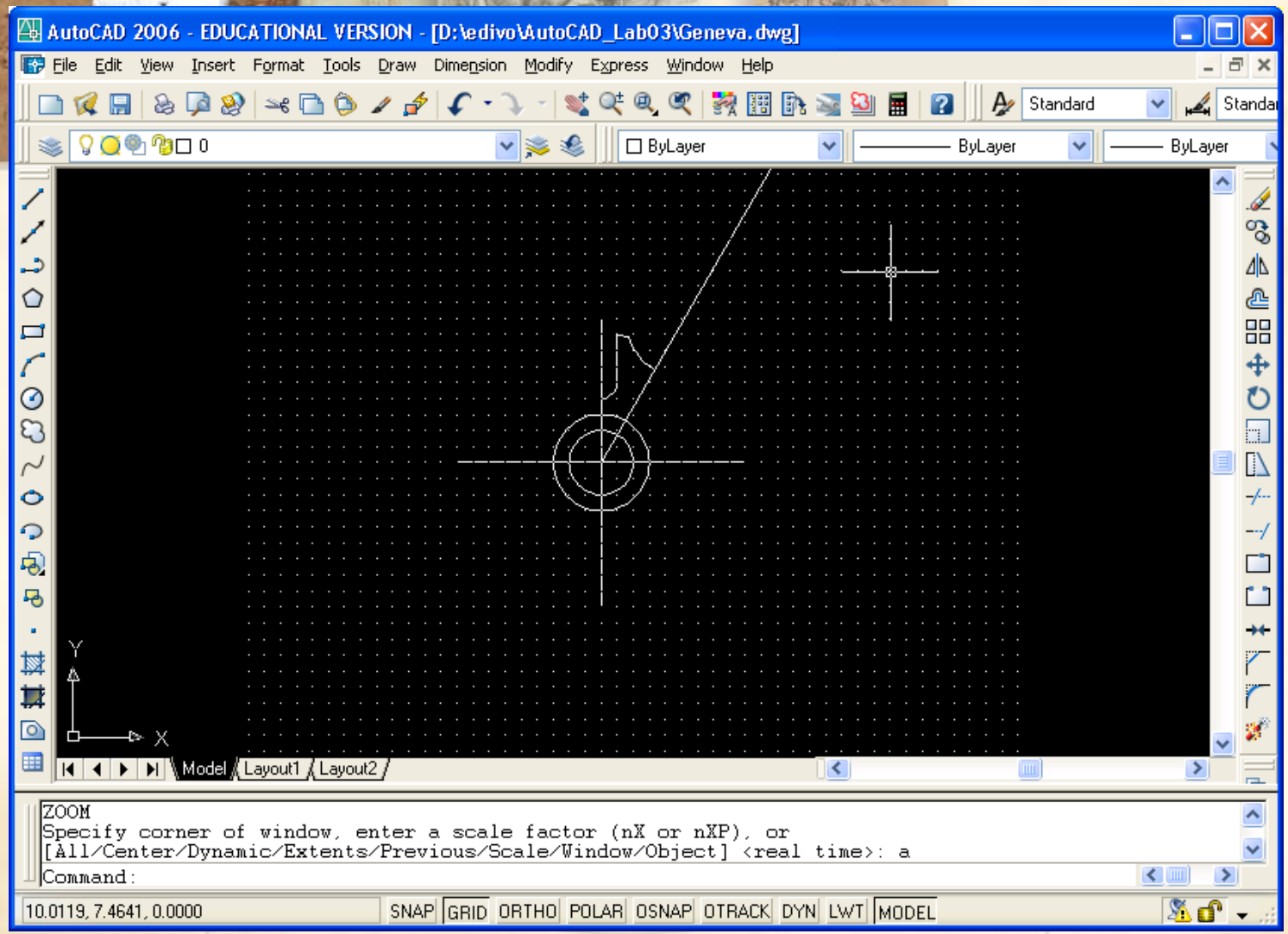
AutoCAD Construction



AutoCAD Construction



AutoCAD Construction

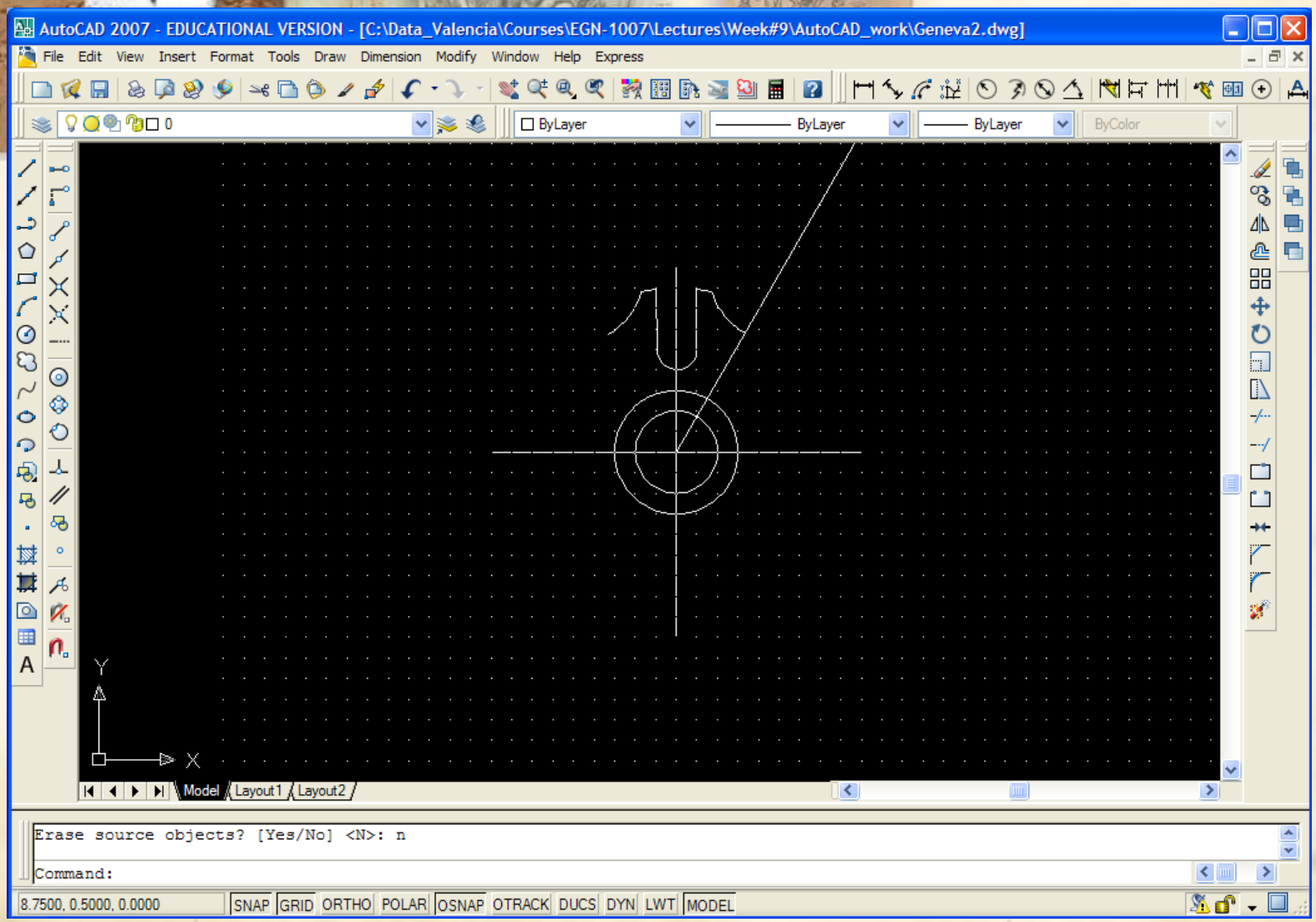


AutoCAD Construction

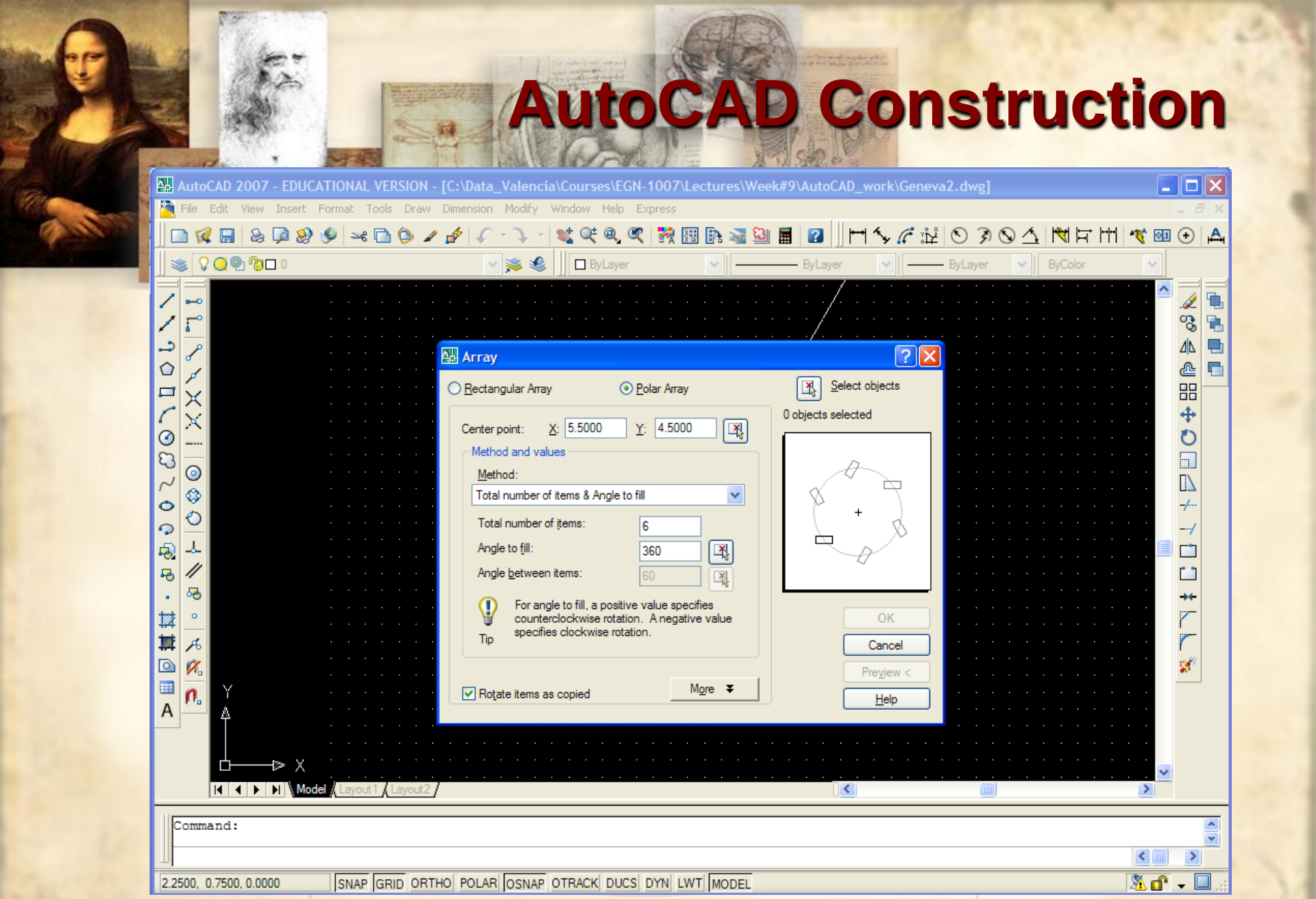
Mirror and array:

- Mirror the four objects you just trimmed using the vertical centerline as the mirror line. Make sure you select "*not to erase source objects*".
- Now we will create a *polar array* of six with the eight objects (source and mirror). Type *array* and specify *polar* mode, with 6 items, and *360* degrees to *fill* with center *5.5, 4.5*.
- Erase the *construction line* and change the properties of the *centerlines* to show center *Linetype* with *LTScale* 0.5.
- Save your work and close the drawing.

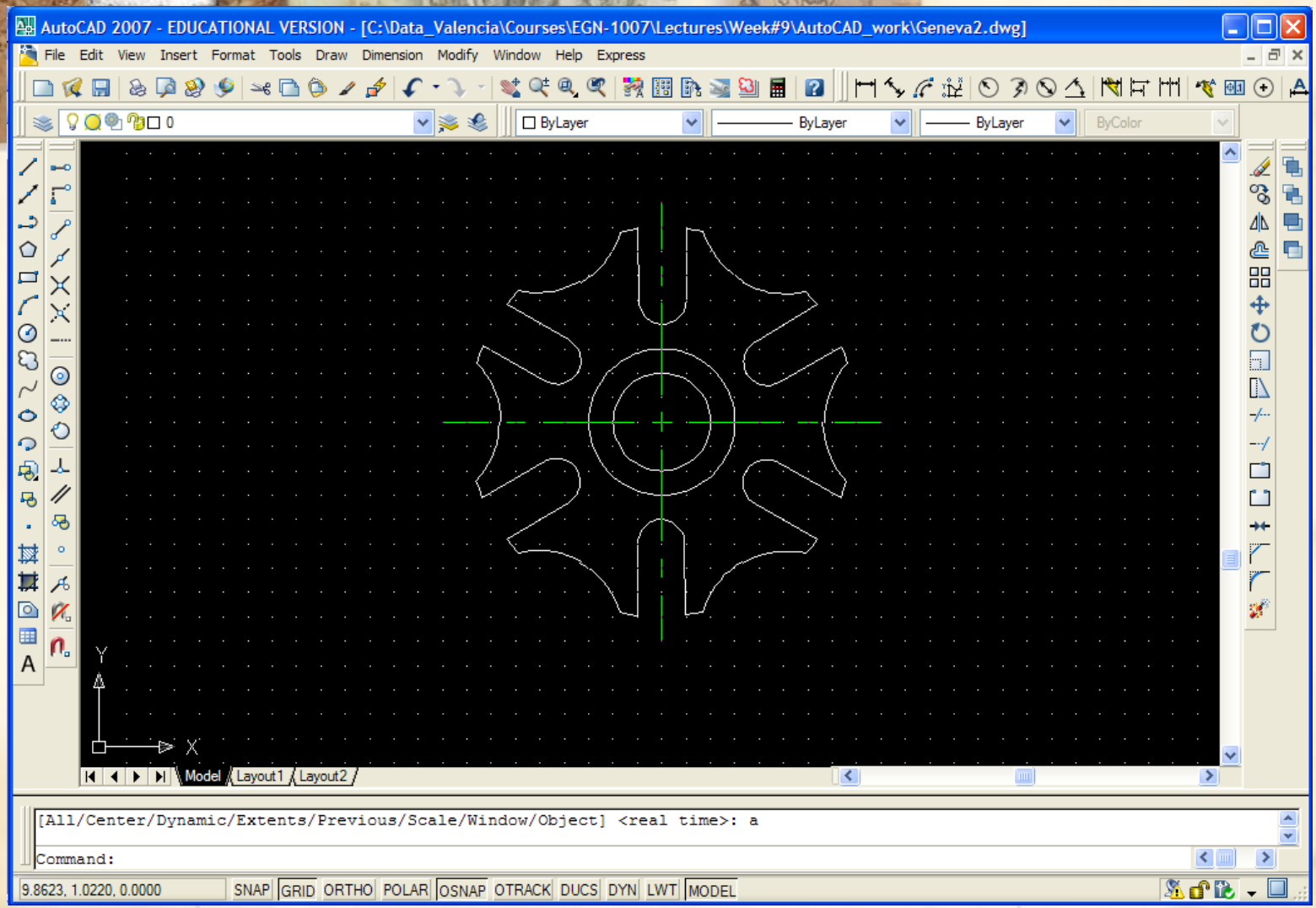
AutoCAD Construction



AutoCAD Construction



AutoCAD Construction

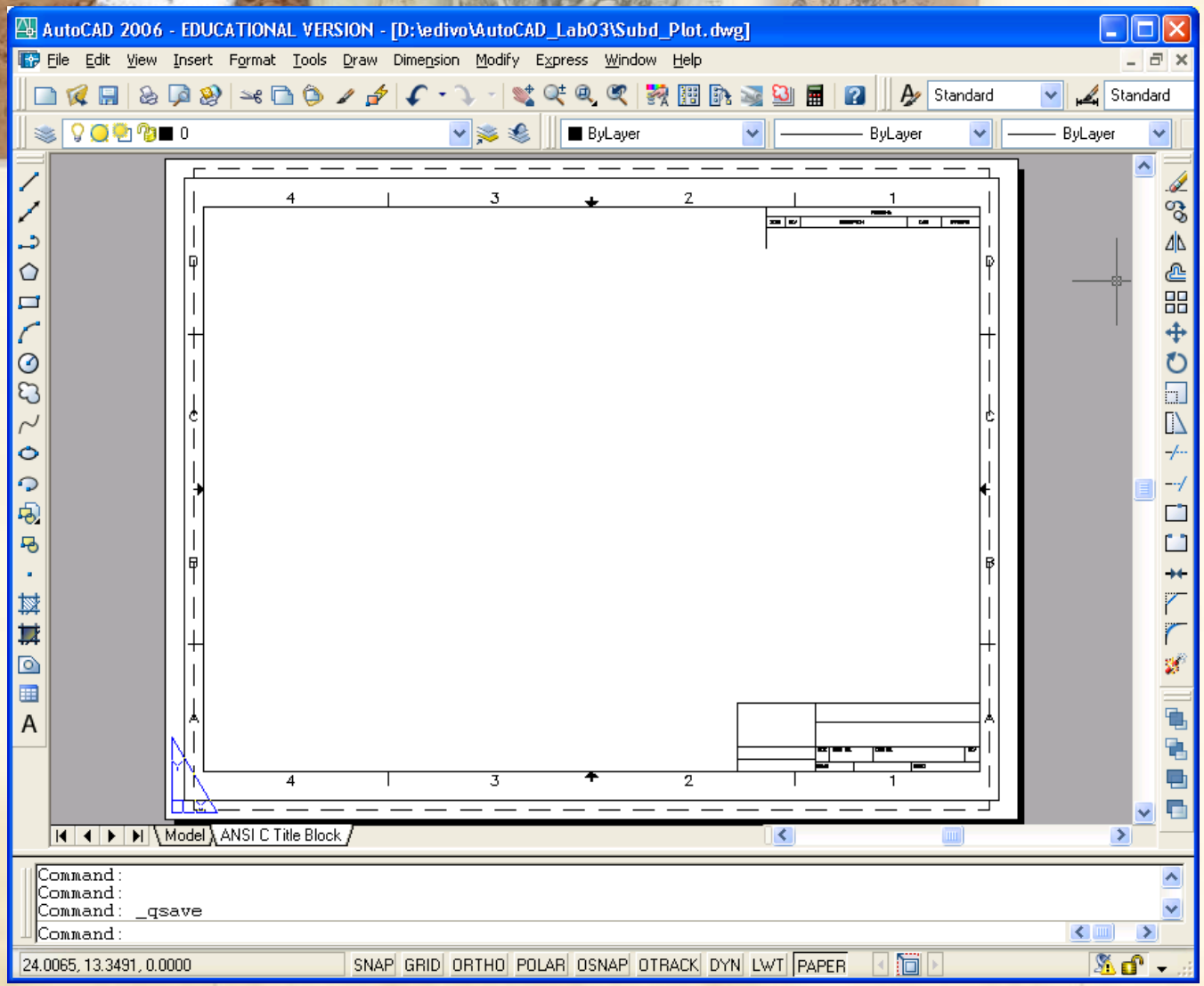


AutoCAD Templates

Create a new file from a standard template:

- **Create a new file and select *ANSI C-Color Dependent Plot Styles.dwt* from the list of available AutoCAD templates.**
- **Save the drawing as *Subd_Plot.dwg* in your current working directory.**
- **ZOOM ALL**
- **Notice the two tabs: one for the *model drawing* and the other for the *sheet of paper*.**
- **The *dashed lines* around the paper sheet indicate the printing area.**

AutoCAD Templates



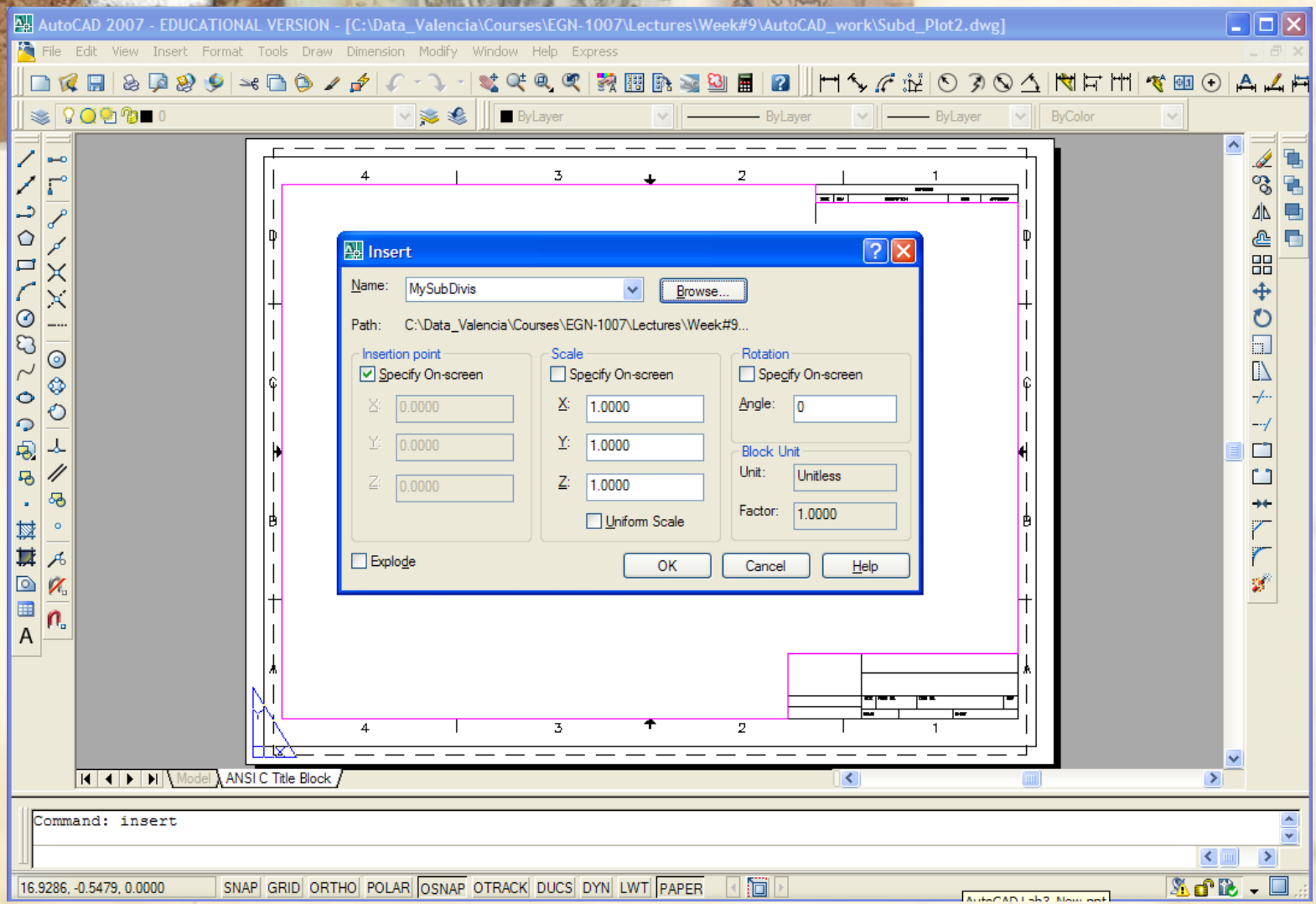
AutoCAD Templates

Inserting an object:

- Change the color of the *Viewport* layer to *magenta* and notice the boundary of the Viewport. This is the area through which the model will show.
- Change to Model Space, make sure layer 0 is current and insert an existing drawing by typing *Insert* or by clicking on the *Insert Block Icon* and selecting the file you created last lab (*MySubDiv.dwg*). Specify 0.0,0.0 as the insertion point.
- ZOOM ALL

NOTE: Skip next slide if you see your MySubDiv.dwg drawing…

AutoCAD Construction



AutoCAD Templates

Paper sheet properties:

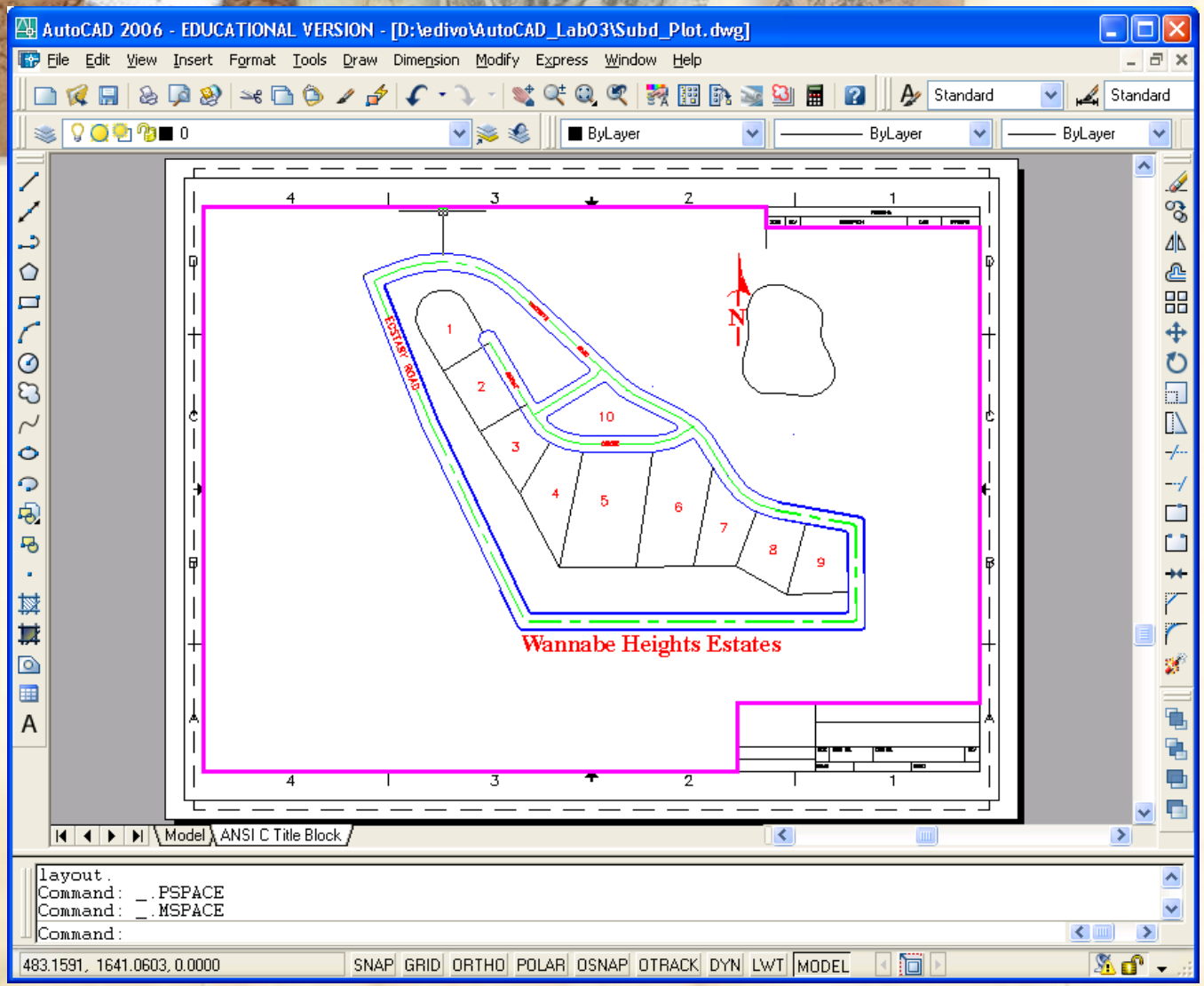
- **Change to *Paper space* and notice that nothing appears in the *Viewport*. The drawing is too large to fit.**
- **Change the *View Scale* of the *Viewport* by selecting the *magenta line* and clicking the *properties icon*.**
- **Select the *Viewport* from the *pull-down* list and change the standard scale to 1:100. (object is still too large to fit)**
- **Notice that it still does not fit. Change the scale using a custom value of 0.007 (~1:150)**

AutoCAD Templates

Paper sheet properties:

- Back in the Paper Space notice that the object is not centered in the Viewport.
- Type *MS* to switch to *model space* or click on the *MODEL/PAPER* status button.
- Use the PAN realtime icon and select a point to PAN the *Viewport* towards the center of the object.

AutoCAD Templates

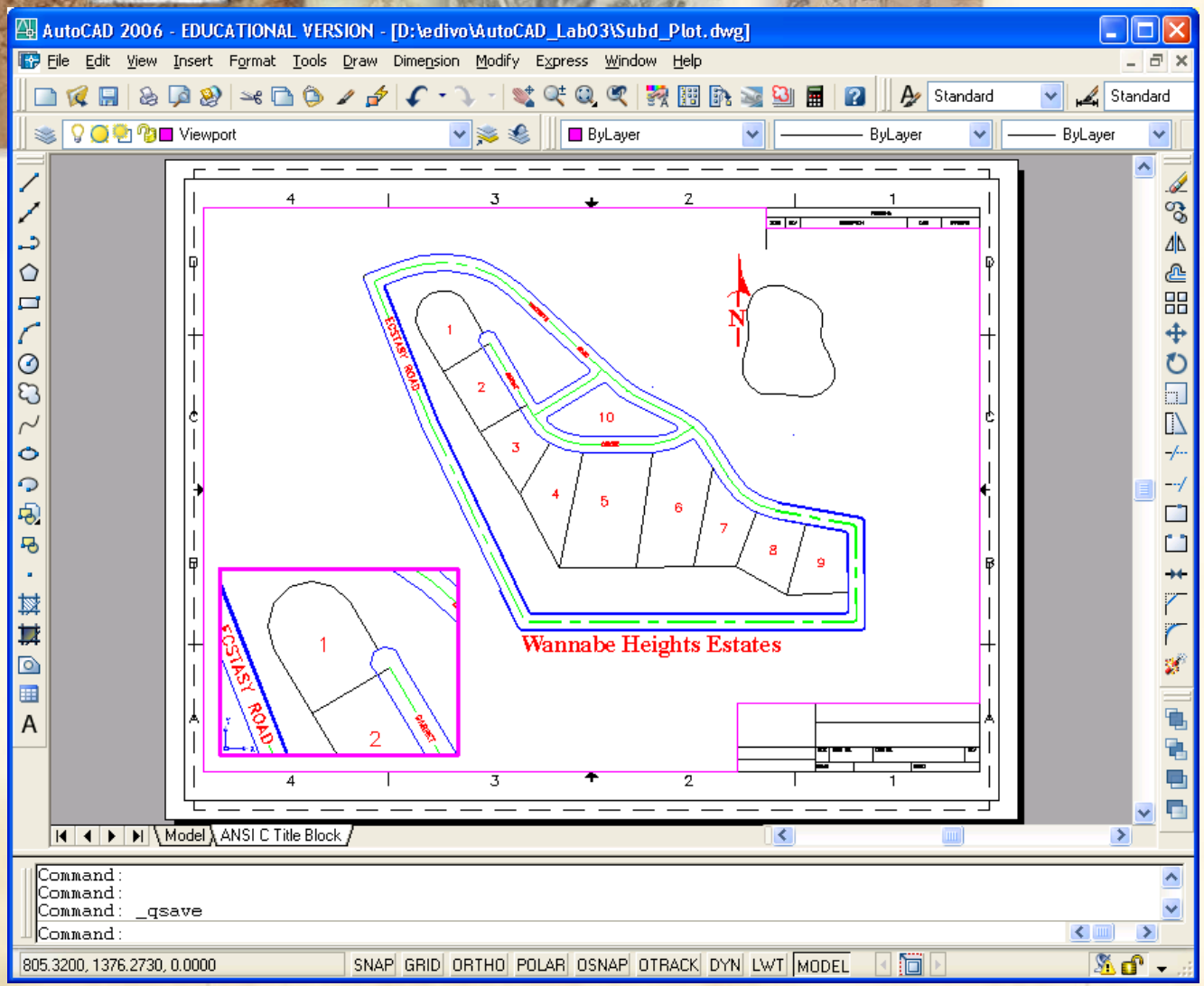


AutoCAD Templates

Create a new Viewport:

- Click the *status button* to go back to *Paper* space, make the *Viewport layer* current, and turn OFF OSNAP.
- From the pull-down menu select: *View -> Viewports -> 1 Viewport*.
- Select two corners near the bottom-left side of the current Viewport to create an additional floating *Viewport*.
- Make the new *Viewport* active by double-clicking inside of it and zoom around Lot 1.

AutoCAD Templates



AutoCAD Templates

Creating your own templates:

- You can create your own *templates* by starting a new drawing from a standard template and saving as an AutoCAD *template* file (.*dwt*).
- Properties such as font size, type, colors, viewports, layouts, etc may be preset to be saved with the template.
- In addition, all layers and specific layer properties can be pre-generated for further use.