



**Computer
Science**

COMPSCI 372 S2C – Exercise Sheet 1

23rd July 2008

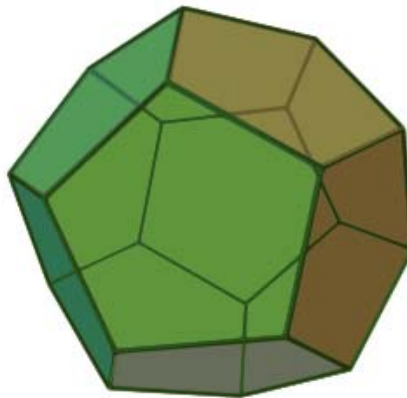
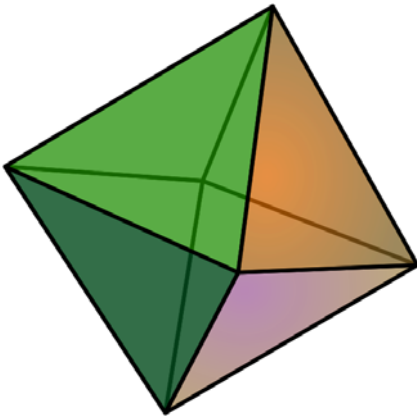
Q1: Go to YouTube (<http://www.youtube.com/>) and find three EXCITING (!) movies explaining applications or cool tools related to Computer Graphics ☺

Here is one example giving a summary of the SIGGRAPH Computer Animation festival:

<http://uk.youtube.com/watch?v=feBKaTJD-TA&feature=related>

I also like this one for its creativity: <http://uk.youtube.com/watch?v=JUdpFN4O4B0&feature=related>

Q2: Show that Euler's formula is valid for an Octahedron (left) and a Dodecahedron (right).



Q3: This question is testing your spatial vision. Please answer it just by thinking about it, i.e. don't use paper, or a computer or physical model.

(a) Imagine you have a cube and rotate it such that one of its diagonals is perpendicular to the xy-plane. Now you move the xy-plane upwards such that it intersects the cube first at the bottom corner and finally at the top corner.

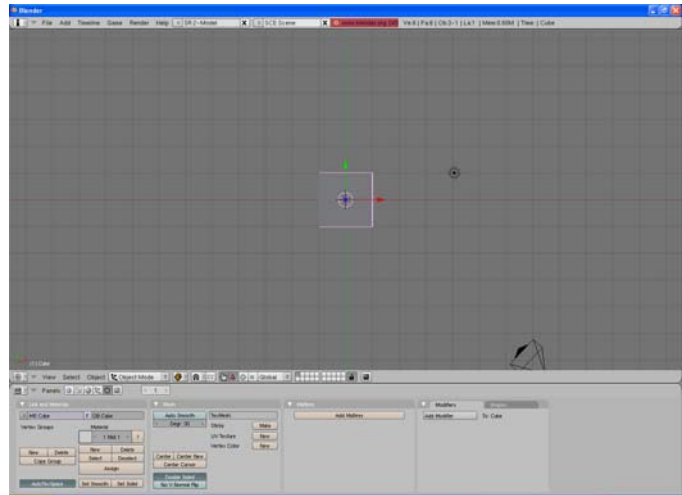
What are the shapes of the intersections of the rotated cube and the plane while you move the plane upwards?

(b) What types of shapes can you create by intersecting a cone with a plane?

Q4: Get familiar with “Blender”: Load, manipulate and render a polygonal mode as described in the steps below (created 6th March 2008 using Blender v. 2.45)

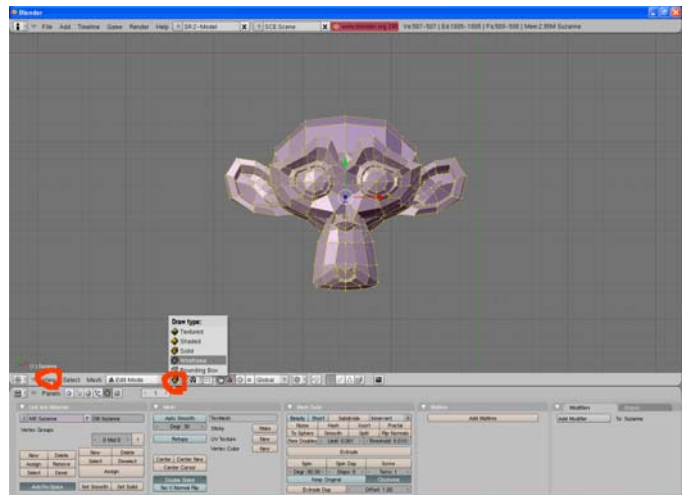
1) Install Blender from <http://www.blender.org/>.

Start the Blender application and you will see the opening screen shown on the right. Delete the default object (a cube) by selecting it and pressing ‘x’.

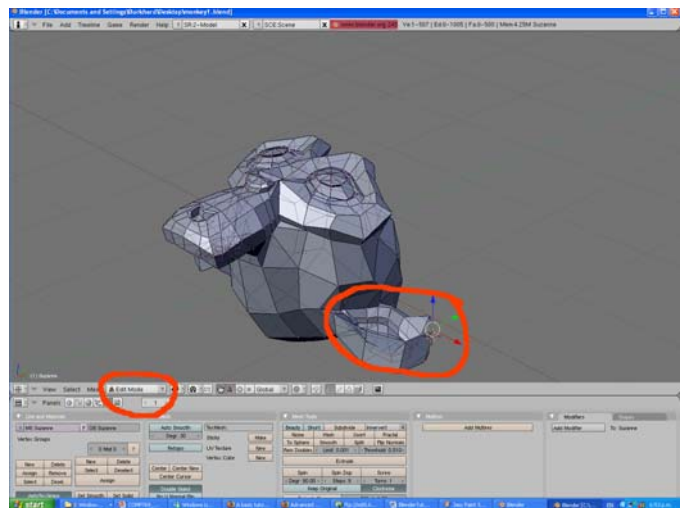


2) Add a polygon mesh of a monkey head by selecting the menu item ‘**Add->Mesh->Monkey**’. The monkey is drawn in solid mode and all its vertices are selected (shown in yellow)

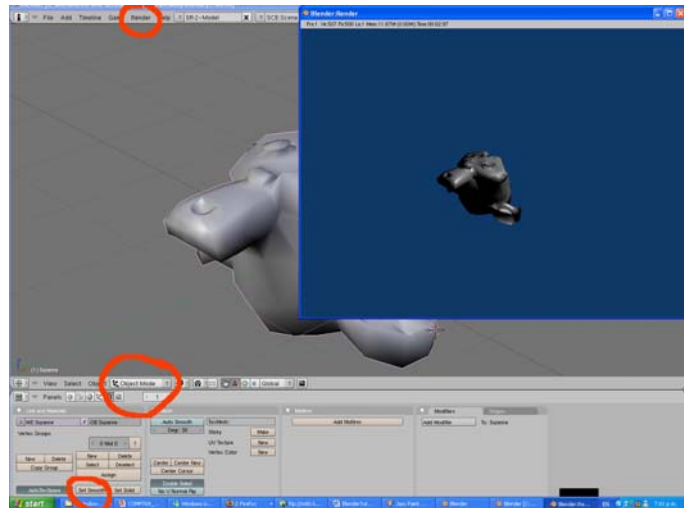
Choose “**View->LocalView**” and try out different drawing modes in the Try out other drawing types by using the ‘**ViewportShading**’ menu.



3) Change the view by using ‘**View->Camera**’ and zoom in using ‘**View->View Navigation -> Zoom In**’. Make sure that you are in **Edit Mode** and modify the shape of the ear by selecting vertices with the right mouse button and moving the mouse.

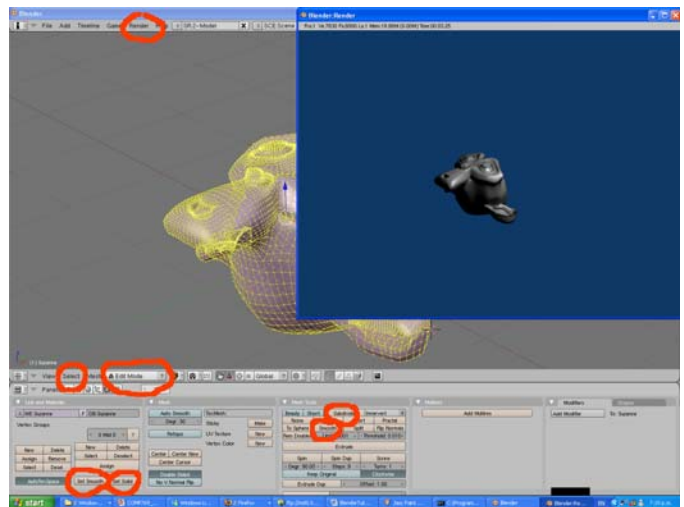


(4) Save your model using **'File-Save As'**. Select **'Object Mode'** and **'Set Smooth'**. This renders the model using Gouraud shading – the mesh itself does not change. You can create a high quality rendering using **'Render->Render Current Frame'**.



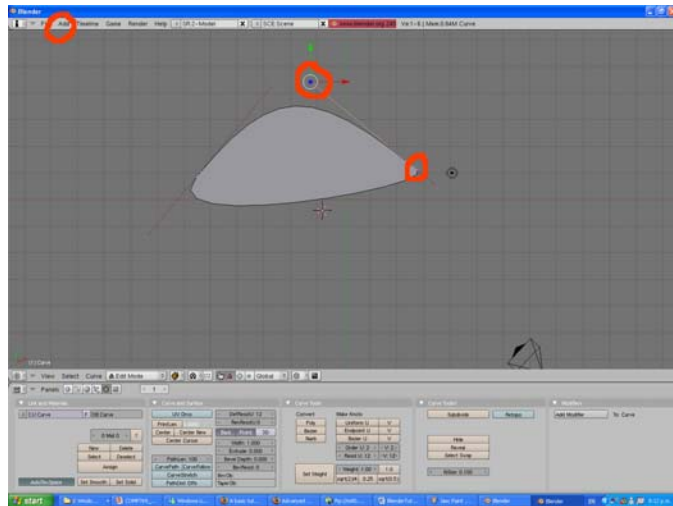
(5) Go back into flat shading mode by selecting **'Set Solid'**. Select **'Edit Mode'** and **'Select->Select All'** (all vertices should now be shown in yellow). Subdivide the mesh twice and use 5-6 smoothing iterations.

Choose **'Set Smooth'** and render the mesh again.

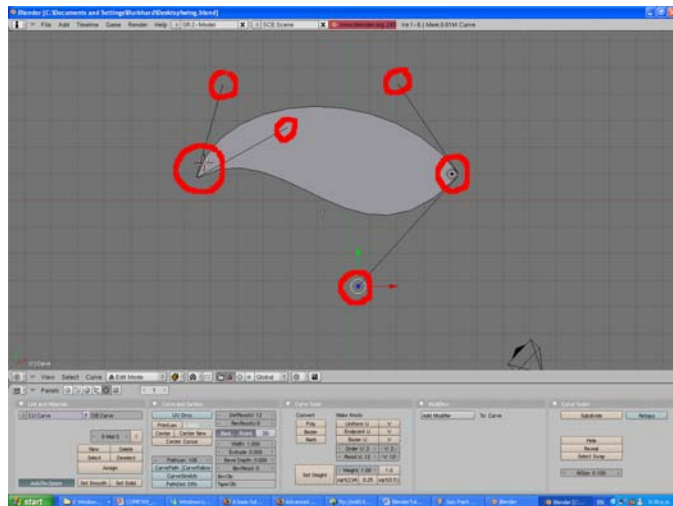


Q4: Get familiar with “Blender”: Create a smoothly rounded 3D model by extruding 2D shapes created using Bezier curves (created 6th March 2008 using Blender v. 2.45)

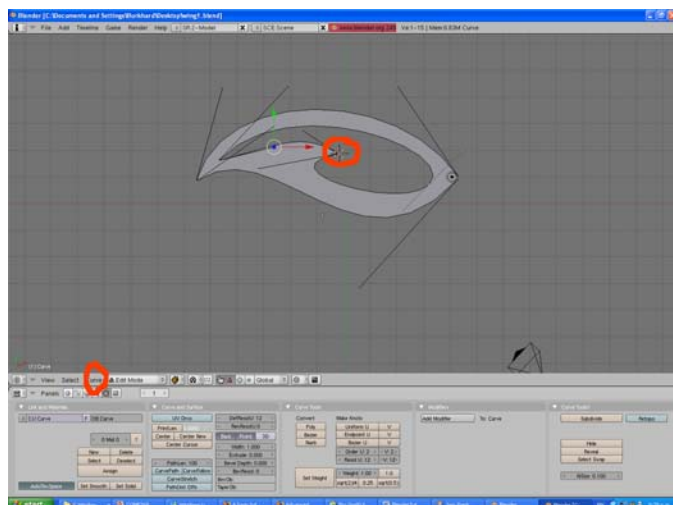
1) Start the Blender application and delete the default object (a cube) by selecting it and pressing ‘x’. Choose ‘Add->Curve->BezierCurve’ to add a Bezier curve. Modify the curve by selecting an endpoint with the right mouse button and moving it. You can modify the shape by selecting the handles at the curve points. Close the curve by selecting an endpoint and pressing ‘c’.



2) Convert the endpoints of the curve to sharp corners by selecting them with the right mouse button and pressing ‘v’. Adjust the curve handles to create the shape in the image on the right.



3) Add another Bezier curve. Select both of its control points (using the shift key) and choose ‘Curve->Segments->Subdivide’. This inserts a new control point into the middle of the curve. Adjust the control points and the handles in order to get the shape in the image on the right.

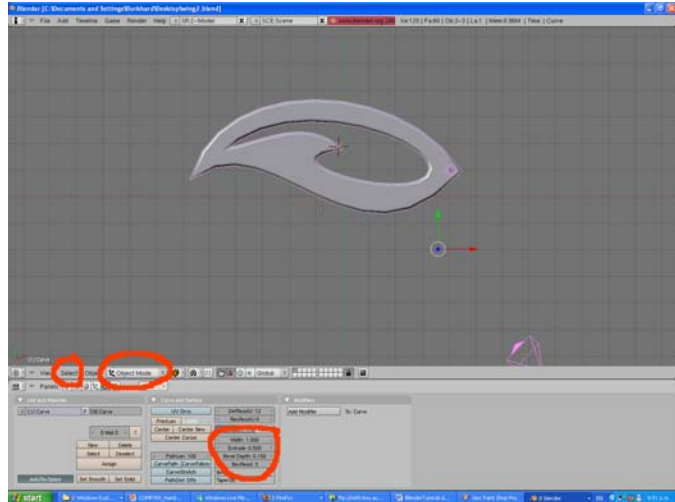


4) Switch to '**Object Mode**'. If the object is not yet selected (highlighted) use '**Select->Select All**'.

In the '**Curves and Surfaces**' window specify the following values:

'Extrude=0.5, Bevel depth=0.1, Bevel resolution=3'.

This extrudes the 2D object by 0.5 units into a 3rd dimension and rounds the corners with a radius of 0.1 units using 3 subdivision steps.



5) Select the camera view ('**View->Camera**') and create a high quality rendering of the object ('**Render->Render Current Frame**').

