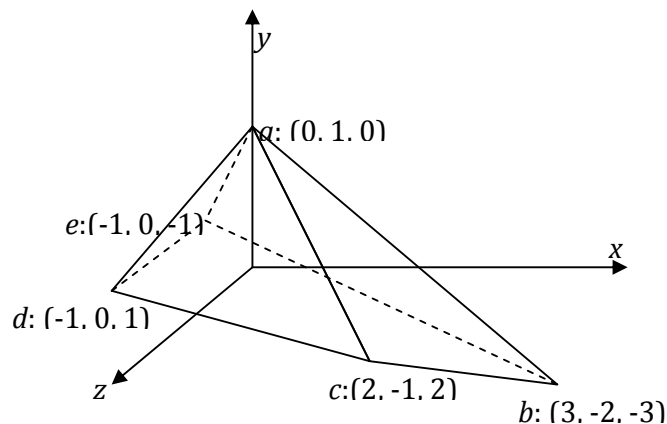


CS3241 Tutorial 5

Question 1

Here are 4 triangles (abc , acd , ade and aeb) on a mesh:



- Compute the normal vectors (which face “upwards”, i.e. $y > 0$) for the 4 triangles.
- Compute the normal vector at all the vertices for shading
- Compute the normal vector at the point p : $(-0.5, 0.5, 0.5)$ for Phong Shading on triangle adc .

Question 2

Other than computing a vertex normal vector for shading by averaging the normals of neighboring polygons, we can directly compute the normal vector of a vertex by other methods.

For example, we would like to draw a paraboloid with the formula $z = x^2 + y^2$ by the following code:

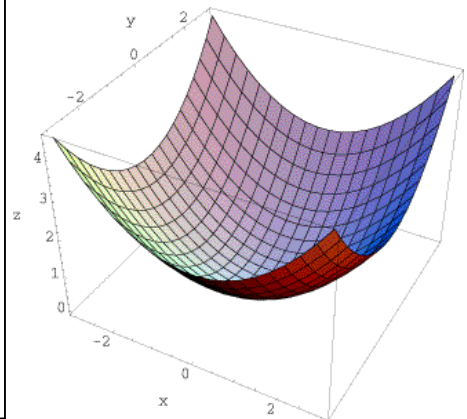
```
for (x = -2.5; x < 2.5; x+=0.25)
  for(y = -2.5; y < 2.5; y+=0.25)
  {
    x1 = x+0.25; y1 = y+0.25;
    glBegin(GL_POLYGON);

    glVertex3f(x,y, x*x + y*y);

    glVertex3f(x1,y, x1*x1 + y*y);

    glVertex3f(x1,y1, x1*x1 + y1*y1);

    glVertex3f(x,y1, x*x + y1*y1);
    glEnd();
  }
```



- Compute the two partial differentiations of z , namely $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$. What is the meaning of these two numbers?
- Compute the two tangent vectors of a point (x,y) along x and y directions
- Compute the normal vector of (x,y) . Hence, fill in the code for the normal vectors

Question 3

Please bring your Lab 3, show the class your code and explain how you computed the normal in your