

## Exam – Computer Graphics

8 April 2010, 14-19

- 1 (a) What are *homogenous coordinates*? (0.5)  
(b) What is the advantage of using them? (0.5)
- 2 (a) What is *backface culling*. (0.2)  
(b) Describe how it can be implemented. (0.4)  
(c) Explain the terms *tangent* and *binormal*. (0.4)
- 3 (a) What is *perspective correct interpolation*?. (0.3)  
(b) Describe how it can be done. (0.7)
- 4 (a) In what respects are *ray tracing* and *radiosity* similar? How are they different? (0.4)  
(b) What is *Perlin noise*? What can it be used for? (0.3)  
(c) Explain the term *key frame animation*. (0.3)
- 5 Describe what is drawn on the screen after a call to the function *draw()* below.

```
def draw():
    glColor(1, 0, 0)
    glPushMatrix()
    glScale(2, 1, 1)
    glTranslate(-2, 0, 0)
    drawSquare()

    glColor(0, 1, 0)
    glTranslate(2, 3, 0)
    glPushMatrix()
    glRotate(90, 0,0,-1)
    glPushMatrix()
    glRotate(180, 0,0,1)
    glTranslate(-2, -1, 0)
    glPushMatrix()
    glPopMatrix()
    glScale(2, 2, 1)
    drawSquare()

    glColor(0, 0, 1)
    glPopMatrix()
    glPushMatrix()
    glRotate(90, 0,0,1)
    glTranslate(-1, 0, 0)
    drawSquare()

def drawSquare():
    glBegin(GL_QUADS)
    glVertex(0,0)
    glVertex(0,1)
    glVertex(1,1)
    glVertex(1,0)
    glEnd()
```

- 6 (a) State the per-pixel and per-vertex expressions for the diffuse reflection according to Phong's reflection model in a point with barycentric coordinates  $(b_0, b_1, b_2)$ . The vertices of the triangle have normals  $(\mathbf{n}_0, \mathbf{n}_1, \mathbf{n}_2)$  the light comes from a directional light source such that the light vector is  $\mathbf{L}$  and the light intensity at the triangle is  $I$ . (0.8).
- (b) In Phong's reflection model there is a so called *ambient* term. What is it and what is its purpose? (0.2)

THE END!