

COM1370 Spring 2003 Quiz #2 - Prof. Futrelle

THIS IS VERSION A

Wednesday 21 May - Closed book/notes

The students to your left and right should have Version B. The two versions differ in details, but are otherwise equivalent in difficulty. Please take your copy of the quiz with you when done. Do not hand it in and do not write your answers on it. Write your answers on the answer sheet. The quiz consists of four questions and some extra credit.

QUESTION 1:

Assume you have a plane in 3D with the following vertices, in the order listed:

$A = [1,0,0]$, $B = [0,0,1]$, $C = [0,1,1]$, $D = [1,1,0]$.

- Using the edges AB and BC, compute the normal, N, to the plane.
- In what direction does N point and how does this show which is the "outside" surface of the plane?
- Compute the inner product of N with the edge CD. Do you get the expected result?

Hint: It would help you (and the grader, Prof. Futrelle) if you drew the vertices and the plane.

QUESTION 2:

- Using the equality, $1 = 1^3 = ((1 - t) + t)^3$, compute the four weights of the control points of a cubic Bézier curve.
- Assume that such a curve is defined the the following control points:
 $P_1 = P_3 = [0,0]$, $P_2 = P_4 = [1,0]$.
- Compute the value of the point on the curve at $t = 1/2$.
- Describe the "curve" above (it is unusual), and why you'd expect to get the answer you did. You might want to draw it as part of your explanation.

QUESTION 3:

- Assume a surface with normal vector $N = [0,1]$ is illuminated by a light source in the direction of $L = [3/5, 4/5]$.
- Assume that the incident light level is 10, the ambient light level is 4, the ambient-reflection coefficient is $1/2$ and the diffuse-reflection coefficient is $3/8$.
- Using the above, compute the illumination of the surface.

QUESTION 4:

Working with the triangle below with the illumination values shown at the four corners, estimate the illumination at the point P that would result by applying Gouraud shading. Explain how you arrived at your estimate.

