

CSci 490, Spring 2005, Midterm

Name: _____

1. [7 pts] Distinguish between the terms *raster graphics* and *vector graphics*, and for each, give a specific example of graphical system using it.
2. [8 pts] Explain what the *homogeneous coordinate system* are, and explain why they are useful in the graphics pipeline.
3. [8 pts] Draw the graphics pipeline as discussed in class.
4. [8 pts] Give a single matrix that represents the translation of a point by the vector $(2, 4, 5)$. For example, your matrix should map the point $(1, 0, 2)$ to $(3, 4, 7)$, and it should map $(6, 3, 4)$ to $(8, 7, 9)$.

5. [7 pts] Explain the goal motivating Gouraud shading (i.e., the reason for it), and describe the technique that it involves.

6. [10 pts] The following code draws a line from (x_0, y_0) to (x_1, y_1) (both points being given in window coordinates), where $x_0 < x_1$, $y_0 < y_1$, and $H < W$ where $H = y_1 - y_0$ and $W = x_1 - x_0$.

```
public static void drawLine(int x0, int y0, int x1, int y1) {
    int W = x1 - x0;
    int H = y1 - y0;
    double error = 0.0;
    int y = y0;
    for(int x = x0; x <= x1; x++) {
        drawPixel(x, y);
        error += (double) H / W;
        if(error > 0.5) {
            y++;
            error -= 1.0;
        }
    }
}
```

Bresenham's line-drawing algorithm is similar, but it changes this code in some small ways. Make these changes to the above code, and explain why these changes are significant to Bresenham's algorithm.

7. [7 pts] What is *bump mapping*?

