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 \(W = x_1 - x_0\).

```java
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?
8. [10 pts] Explain two distinct techniques discussed in class for rendering scenes including shadows cast by objects, and discuss their comparative strengths and weaknesses. The techniques should be compatible with the graphics pipeline.

9. [8 pts] Explain the terms diffuse reflection and specular reflection. You should not include mathematical approximations; just describe how they correspond to the world that we see.

10. [7 pts] What motivates the addition of an ambient light component to lighting, even though no such thing exists in the real world?