Name: _____ **Student ID:** _____

1) In terms of a sequence of transforms (translate, rotateX, rotateY, rotateZ), give the view transform from world space to camera space corresponding to a camera at world space point $(2, 5, 0)$ and looking straight at world space point $(10, 5, 0)$.

2) What are homogeneous (4D) coordinates, and how can you convert back and forth with regular 3D coordinates for a point?

3) Why do homogeneous coordinates make translation transforms more convenient? Make sure to include a matrix in your explanation.

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4) Why do homogeneous coordinates make perspective transforms more convenient? Make sure to include a matrix in your explanation.

5) Sketch an example of a triangle where our rasterization algorithm is extremely inefficient.

6) Give pseudocode for the Z-Buffer algorithm.

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7) Give pseudocode (with formulas) for testing if 2D point (x, y) is inside a triangle with corners (x_0, y_0), (x_1, y_1), and (x_2, y_2).

8) **[Challenge]** Consider the barycentric coordinate α of a point (x, y) in a triangle. In what direction does the gradient vector $\nabla\alpha = (\partial\alpha/\partial x\ , \partial\alpha/\partial y)$ point? Illustrate with a sketch.