

CS 230, Quiz 5

Solutions

You will have 10 minutes to complete this quiz. No books, notes, or other aids are permitted.

Problem 1

Why is perspective-correct interpolation necessary? A short 1-2 sentence explanation is sufficient. If your thoughts are easier to explain with the help of an illustration, that is fine, too.

Barycentric coordinates in image space are not the same as barycentric coordinates in world space when there is a perspective transform. Image space barycentric coordinates are computed during rasterization, but world space barycentric coordinates are needed for coloring and texture mapping.

Problem 2

(1) What differential equation will the following numerical scheme solve? (2) Is this scheme forward Euler (FE), backward Euler (BE), midpoint rule (MR), or trapezoid rule (TR)?

$$\frac{w^n - w^{n-1}}{\Delta t} = 3 \cos w^n - 2$$

$$\frac{dw}{dt} = 3 \cos w - 2$$

This discretization is really backward Euler in disguise. This becomes more clear if I relabel n as $n + 1$:

$$\frac{w^{n+1} - w^n}{\Delta t} = 3 \cos w^{n+1} - 2$$