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CSE 167 - Intro to Computer Graphics - Fall 2004
Quiz #4 Answers — November 22 — Interpolation

1. Let $\mathbf{x} = \langle -2, 1, 0 \rangle$ and $\mathbf{y} = \langle 0, 1, -2 \rangle$.

a. What is $Lerp(\mathbf{x}, \mathbf{y}, -1)$ equal to? Answer: $\langle -4, 1, 2 \rangle$.

b. For what α is $Lerp(\mathbf{x}, \mathbf{y}, \alpha) = \langle -\frac{1}{2}, 1, -1\frac{1}{2} \rangle$? Answer: $\alpha = \frac{3}{4}$.

2. A triangle has vertices $\mathbf{x}, \mathbf{y}, \mathbf{z}$ as shown. Also shown are seven points \mathbf{u}_1 - \mathbf{u}_7 . For the following choices of barycentric coordinates indicate which point has those coordinates.

a. $\alpha = 1, \beta = 0, \gamma = 0$.

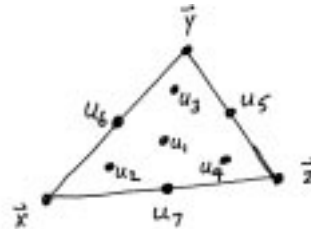
Answer: \mathbf{x} .

b. $\alpha = \frac{1}{2}, \beta = 0, \gamma = \frac{1}{2}$.

Answer: \mathbf{u}_7 .

b. $\alpha = \frac{1}{6}, \beta = \frac{2}{3}, \gamma = \frac{1}{6}$.

Answer: \mathbf{u}_3 .



3. A quadrangle has vertex $\mathbf{u}, \mathbf{v}, \mathbf{w}, \mathbf{x}$ as shown. Give the formula for the point which is found using bilinear interpolation with $\alpha = \frac{1}{2}$ and $\beta = \frac{1}{3}$. Your formula should not involve α and β , instead use the particular values for α and β . (Remark: Here the point \mathbf{u} is found $\alpha = 0, \beta = 0$ and the point \mathbf{v} with $\alpha = 1, \beta = 0$.)

Answer: $\frac{1}{3}\mathbf{u} + \frac{1}{3}\mathbf{v} + \frac{1}{6}\mathbf{x} + \frac{1}{6}\mathbf{y}$.

