Math 155A - Spring 2022 - Quiz #11 - May 12

Name: Answer Key

PID:

1. Let $\mathbf{u} = \langle 1, 2, 3\rangle$ and $\mathbf{v} = \langle 5, 2, 9\rangle$.

(a) What is $Lerp(\mathbf{u}, \mathbf{v}, \frac{1}{3})$? $\langle \frac{7}{3}, 2, 5 \rangle$

(b) What is $Lerp(\mathbf{v}, \mathbf{u}, \frac{2}{3})$? $\langle 5, 2, \frac{7}{3} \rangle$

(c) What is $Lerp(\mathbf{u}, \mathbf{v}, 1)$? $\langle 5, 2, 9 \rangle$

(d) What is $Lerp(\mathbf{u}, \mathbf{v}, -1)$? $\langle -3, 2, -3 \rangle$

(e) What value of α makes $Lerp(\mathbf{u}, \mathbf{v}, \alpha)$ equal to $\langle 2, 2, \frac{9}{2}\rangle$?

Solve: $\langle 2, 2, 9/2 \rangle - \langle 1, 2, 3 \rangle = \alpha(\vec{v} - \vec{u}) = \alpha \cdot \langle 4, 0, 6 \rangle$

i.e., $\langle 1, 0, \frac{3}{2} \rangle = \alpha \langle 4, 0, 6 \rangle$.

$\boxed{\alpha = \frac{1}{4}}$

Alternately: $\alpha = \dfrac{\langle 2, 2, 9/2 \rangle \cdot \langle 4, 0, 6 \rangle}{\langle 4, 0, 6 \rangle \cdot \langle 4, 0, 6 \rangle} = \dfrac{8 + 18}{16 + 36} = \dfrac{26}{52} = \boxed{\dfrac{1}{4}}$

(f) Let L be the line containing $\mathbf{u}$ and $\mathbf{v}$. Let $\mathbf{z} = \langle 1, 2, 9\rangle$. Find the value β such that $Lerp(\mathbf{u}, \mathbf{v}, \beta)$ is the point on the line L that is closest to $\mathbf{z}$.

$$\beta = \frac{(\vec{z} - \vec{u}) \cdot (\vec{v} - \vec{u})}{(\vec{v} - \vec{u}) \cdot (\vec{v} - \vec{u})} = \frac{36}{52} = \boxed{\frac{9}{13}}$$