Quiz 2 (8/a) → (9/a)

1) $x = [2,3,5]$

$y = [-1,-1,-5]$

$\text{Proj}_{\underset{\sim}{y}}(\underset{\sim}{x}) = \frac{(\underset{\sim}{x}\cdot\underset{\sim}{y})}{(\underset{\sim}{y}\cdot\underset{\sim}{y})}\underset{\sim}{y}$

$x \cdot y = (-2)+(-3)+(-25) = -30$

$y \cdot y = 1+1+25 = 27$

$-\frac{30}{27}[-1,-1,-5]$

$\frac{10}{9}[1,1,5]$

2) $A = (0,-1,-2)$ $\quad \overrightarrow{AB} = [1,-3,-2]$

$B = (1,-4,-4)$

$P = (k,k,k)$ $\quad \overrightarrow{AP} = [k, k+1, k+2]$

$\overrightarrow{AB} \cdot \overrightarrow{AP} = k - 3(k+1) - 2(k+2) = 0$

$k - 3k - 3 - 2k - 4 = 0$

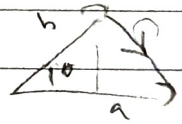
$-4k = 7$

$k = -\frac{7}{4}$

$\|\underset{\sim}{a}-\underset{\sim}{b}\|^2 = \|\underset{\sim}{a}\|^2 + \|\underset{\sim}{b}\|^2 - 2(\underset{\sim}{a}\cdot\underset{\sim}{b})$

3) $[1,3,-4]\cdot[-2,-2,-5]$

$(-2)+(-6)+(20) = 12$



$|\underset{\sim}{a}-\underset{\sim}{b}|^2 = |\underset{\sim}{a}|^2 + |\underset{\sim}{b}|^2 - 2|\underset{\sim}{a}||\underset{\sim}{b}|\cos\theta$

4) $\underset{\sim}{a} = [-3,-2,2]$

$\underset{\sim}{b} = [3,-1,-2]$

$\cos\theta = \frac{\underset{\sim}{a}\cdot\underset{\sim}{b}}{|\underset{\sim}{a}||\underset{\sim}{b}|}$

$(\underset{\sim}{a}-\underset{\sim}{b})(\underset{\sim}{a}-\underset{\sim}{b}) = |\underset{\sim}{a}|^2 - (\underset{\sim}{a}\cdot\underset{\sim}{b}) - (\underset{\sim}{a}\cdot\underset{\sim}{b}) + |\underset{\sim}{b}|^2$

$-2(\underset{\sim}{a}\cdot\underset{\sim}{b}) = -2|\underset{\sim}{a}||\underset{\sim}{b}|\cos\theta$

$\underset{\sim}{a}\cdot\underset{\sim}{b} = (-9)+(2)+(-4) = -11$

$|a| = \sqrt{17}$

$|b| = \sqrt{14}$

$\cos\theta = \frac{-11}{\sqrt{17}\cdot\sqrt{14}}$

$\sqrt{6}\left[\frac{1}{\sqrt{6}}\right.$ $\quad \frac{4}{6}+\frac{16}{6}+\frac{4}{6}+\frac{25}{6}+\frac{9}{6}+\frac{9}{6}$

$\frac{8+16+25+18}{6}$ $\quad 42$

$\sqrt{\frac{7}{6}}$

$\text{proj}_{\underset{\sim}{v}}(\underset{\sim}{u}) =$

$\underset{\sim}{u} \cdot \underset{\sim}{v} = (2) + (12) + (-20) = -6$

$\underset{\sim}{v} \cdot \underset{\sim}{v} = 4 + 9 + 25 = 38$

$\frac{-6}{38}[-2, -3, 5]$

$\frac{3}{19}[2, 3, -5]$

$\left[\frac{6}{19}, \frac{9}{19}, \frac{-15}{19}\right]$

~~$\underset{\sim}{u} = [2, 5, 5]$~~

$\underset{\sim}{u} \times \underset{\sim}{v}$ ~~5 5 2 5~~ $= [45, 5, -23]$

$-4\ 5\ 3\ -4$

$\underset{\sim}{u} \cdot \underset{\sim}{v} = 6 + (-20) + (25) = 11$

$\underset{\sim}{u} \cdot \underset{\sim}{w} = (4) + (-20) + (-25) = -41$

$\underset{\sim}{v} \cdot \underset{\sim}{w} = (6) + (16) + (-25) = -3$

$\sqrt{4+81}$

$v \cdot v = 9 + 16 + 25 = 50$

$u \cdot v + u \cdot w = 11 + (-41) = -30$

$0 + (-30) = -30$ (4)

$[-2, 4, 2, -5, -3, -3]$

$\sqrt{4+16+4+25+9+9}$