Dawson College: Linear Algebra: 201-105-05-S4: Fall 2016

Name: Y. Lamontagne

Quiz 9

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §3.1

9b. *(2 marks)* Find the initial point of the vector that is equivalent to $\vec{u} = (1,1,3)$ and whose terminal point is $B(-1,-1,2)$.

$$\vec{AB} = \vec{u}$$
$$B - A = \vec{u}$$
$$B - \vec{u} = A$$
$$A = (-1,-1,2) - (1,1,3)$$
$$A = (-2,-2,-1)$$

10b. *(2 marks)* Find the terminal point of the vector that is equivalent to $\vec{u} = (1,1,3)$ and whose initial point is $A(0,2,0)$.

$$\vec{AB} = \vec{u}$$
$$B - A = \vec{u}$$
$$B = A + \vec{u}$$
$$B = (0,2,0) + (1,1,3)$$
$$B = (1,3,3)$$

Question 2. §3.2 #20b *(2 marks)* Find a unit vector that is oppositely directed to the given vector: $(3,-3,-3)$.

$$\text{unit vector} = \frac{(3,-3,-3)}{\|(3,-3,-3)\|} = \frac{(3,-3,-3)}{\sqrt{3^2+(-3)^2+(-3)^2}} = \frac{(3,-3,-3)}{\sqrt{9+9+9}} = \frac{(3,-3,-3)}{\sqrt{27}}$$
$$= \frac{(3,-3,-3)}{3\sqrt{3}}$$
$$= \left(\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}\right)$$

$$\text{oppositely directed} = -\left(\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}\right)$$
$$= \left(\frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$$

Question 3. §3.2 #24d *(4 marks)* Find the radian measure of the angle θ (with $0 \le \theta \le \pi$) between $\vec{u} = (1,-1,0)$ and $\vec{v} = (1,0,0)$.

$$\vec{u} \cdot \vec{v} = \|\vec{u}\|\|\vec{v}\| \cos\theta$$
$$(1,-1,0) \cdot (1,0,0) = \|\vec{u}\|\|\vec{v}\| \cos\theta$$
$$1(1) + (-1)(0) + 0(0) = \sqrt{1^2+(-1)^2+0^2}\sqrt{1^2+0^2+0^2}\cos\theta$$
$$1 = \sqrt{2}\sqrt{1}\cos\theta$$
$$\cos\theta = \frac{1}{\sqrt{2}}$$
$$\theta = \frac{\pi}{4}$$