King Fahd University of Petroleum and Minerals

Prep-Year Math Program Math 002 - Term 151 **Recitation (8.3)**

Question 1: Given the vectors $u = \langle 8, -10 \rangle$ and $v = \langle 6, -12 \rangle$.

- a. Find a unit vector in the opposite direction of the vector $\frac{1}{2}u \frac{1}{2}v$
- b. Find a vector of length 3 units in the direction of the vector $\frac{1}{2}u \frac{1}{6}v$

Answer: (a):
$$\left\langle -\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right\rangle$$
 (b): $\left\langle \frac{3\sqrt{2}}{2}, -\frac{3\sqrt{2}}{2} \right\rangle$

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Question 2 Find the smallest positive angle between the vectors u = 2i + 3j and $w = \frac{1}{5}i - j .$

Answer: 135°

Question3: If $u = \langle 2, -2\sqrt{2} \rangle$, $v = \langle 0, \sqrt{2} \rangle$, then find the **magnitude** and **direction angle** θ of the vector $w = \sqrt{2}u - 2v + 4j$

Answer:
$$\|\mathbf{w}\| = \sqrt{8+8} = 4$$
 $\theta = \frac{7\pi}{4}$

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Question 4: For the vectors $\vec{\mathbf{u}} = <0,5>$ and $\vec{\mathbf{v}} = <-2,2>$, the smallest positive angle between the vectors $\vec{\mathbf{u}} + \vec{i}$ and $\vec{\mathbf{v}} + \vec{j}$ is

Answer: $\theta = 45^{\circ}$

Question5: The sum of all values of the constant k for which the two vectors: $\vec{u} = (k-1)\vec{i} + \vec{j}$ and $\vec{v} = 3\vec{i} + (k-1)^2 \vec{j}$ are perpendicular is equal to:

A) 4 B) -2

-1 C)

D) 3 E) -3

Answer: k = 1, k = -2 \Rightarrow sum = 1+(-2) = -1