King Fahd University of Petroleum and Minerals

Prep-Year Math Program

Math 002 - Term 132

Recitation (8.3)

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

a) Find the magnitude and the direction angle of the vector $\frac{1}{2}\boldsymbol{u}-\frac{1}{6}\boldsymbol{v}$

b) Find a unit vector in the opposite direction of the vector $\frac{1}{2}\boldsymbol{u}-\frac{1}{6}\boldsymbol{v}$

c) Find a vector of length 3 units in the direction of the vector $\frac{1}{2}\boldsymbol{u}-\frac{1}{6}\boldsymbol{v}$

Answer: (a): $\left\|\frac{1}{2}\boldsymbol{u}-\frac{1}{6}\boldsymbol{v}\right\|=\|\langle 3,5\rangle\|=\sqrt{34}$

The direction angle θ of $\frac{1}{2}\boldsymbol{u}-\frac{1}{6}\boldsymbol{v}=\langle 3,5\rangle$ is $\theta=\tan^{-1}\frac{5}{3}$

(b): A unit vector in the **opposite** direction of $\frac{1}{2}u-\frac{1}{6}v=\langle 3,5\rangle$ is $\vec{W}=\left\langle -\frac{3\sqrt{34}}{34},-\frac{5\sqrt{34}}{34}\right\rangle$

(b): A vector of magnitude 3 in the direction of $\frac{1}{2}\boldsymbol{u}-\frac{1}{6}\boldsymbol{v}=\langle 3,5\rangle$ is $\left\langle \frac{9\sqrt{34}}{34},\frac{15\sqrt{34}}{34}\right\rangle$

Question2: 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) -3
b) 4
c) -2
d) 3
e) -1

Answer: $k=1$, $k=-2$

Question 3 Find the **smallest positive angle** between the vectors $\boldsymbol{v}=\langle 2,3\rangle$ and $\boldsymbol{w}=\frac{1}{5}\boldsymbol{i}-\boldsymbol{j}$

Answer: 135°