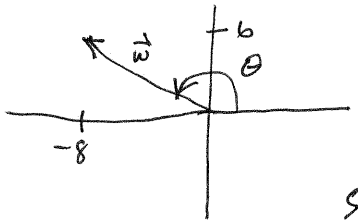
MATH 11022–006 | Trigonometry | Dr. Kracht
TR 11:00 | Spring 2014

Name: KEY Quiz Score: /20

Quiz 10

Show your reasoning clearly for full credit.

1. (5 pts) Determine the direction angle θ of the vector $\vec{w} = -8\,\vec{i} + 6\,\vec{j}$. *Round your answer to the nearest degree.*

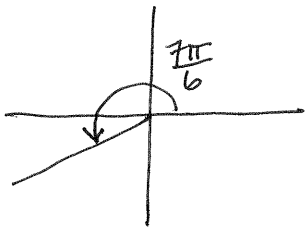


$\tan\theta = \frac{6}{-8} = -\frac{3}{4}$ and $\theta \in (\pi/2, \pi)$

$\tan^{-1}\left(-\frac{3}{4}\right) \approx -37^\circ$

so $\theta = 180^\circ - 37^\circ = 143^\circ$

2. (5 pts) Calculate and sketch the unit vector $\vec{u}$ with direction angle $\theta = \frac{7\pi}{6}$. *Write it in the form $a\,\vec{i} + b\,\vec{j}$, where a, b are exact values.*



$\vec{u} = \cos\left(\frac{7\pi}{6}\right)\vec{i} + \sin\left(\frac{7\pi}{6}\right)\vec{j}$

$= -\frac{\sqrt{3}}{2}\vec{i} - \frac{1}{2}\vec{j}$

3. (5 pts) Are the vectors $< -1, 3 >$ and $< 6, 2 >$ perpendicular? *Justify your answer.*

Check the dot product:

$\langle -1, 3\rangle \cdot \langle 6, 2\rangle = (-1)(6) + (3)(2)$

$= -6 + 6$

$= 0$ ✓ yes, they are perpendicular.

4. (5 pts) Find the angle θ between the vectors $< 3, 5 >$ and $< 5, 5 >$. *Round your answer to the nearest degree.*

$\cos\theta = \frac{\vec{u}\cdot\vec{v}}{|\vec{u}|\,|\vec{v}|} = \frac{(3)(5)+(5)(5)}{\sqrt{3^2+5^2}\,\sqrt{5^2+5^2}}$

$= \frac{15+25}{\sqrt{34}\,\sqrt{50}} = \frac{40}{\sqrt{34\cdot 50}}$

$\theta = \cos^{-1}\left(\frac{40}{\sqrt{34\cdot 50}}\right) \approx 14^\circ$