

Name: _____

Vectors and Dot Products

Exercise 1: Find the angle θ between the vectors

1) $u = \langle 6, 5 \rangle, v = \langle -2, -8 \rangle$

2) $u = \langle 4, -3 \rangle, v = \langle 2, 1 \rangle$

3) $u = \langle 1, 2 \rangle, v = \langle 5, 4 \rangle$

4) $u = \langle 5, 4 \rangle, v = \langle 7, 6 \rangle$

5) $u = \langle 2, 1 \rangle, v = \langle 5, 9 \rangle$

6) $u = \langle 0, -2 \rangle, v = \langle -10, 0 \rangle$

7) $u = \langle \sqrt{3}, \sqrt{2} \rangle, v = \langle -2\sqrt{3}, -9\sqrt{2} \rangle$

8) $u = \langle \sqrt{11}, 5 \rangle, v = \langle -3, 6\sqrt{11} \rangle$

9) $u = 5i + 4j; v = -6i + 7j$

10) $u = -2i + 3j; v = 2i - 5j$

Exercise 2: Use the vectors to find the interior angles of the triangle with the given vertices:

1) $(2, 3), (4, 3), (5, 4)$

2) $(1, 2), (3, 4), (2, 5)$

3) $(-3, 0), (2, 2), (0, 6)$

4) $(-3, 5), (-1, 9), (7, 9)$

Exercise 3: Find $u \bullet v$, where θ is the angle between u and v .

1) $\|u\| = 4, \|v\| = 10, \theta = \frac{2\pi}{3}$

2) $\|u\| = 2, \|v\| = 9, \theta = \frac{\pi}{6}$

3) $\|u\| = 1, \|v\| = 9, \theta = \frac{\pi}{3}$

4) $\|u\| = 9, \|v\| = 36, \theta = \frac{3\pi}{4}$

5) $\|u\| = 4, \|v\| = 12, \theta = \frac{\pi}{4}$

6) $\|u\| = 5, \|v\| = 12, \theta = \frac{4\pi}{7}$

Exercise 4: Determine whether u and v are parallel, perpendicular, or neither.

1) $u = \langle -12, 30 \rangle, v = \langle \frac{1}{2}, \frac{-5}{4} \rangle$

2) $u = \langle -2, 4 \rangle, v = \langle \frac{3}{5}, \frac{2}{7} \rangle$

3) $u = \langle -4, 3 \rangle, v = \langle 3, 4 \rangle$

4) $u = \langle -11, 12 \rangle, v = \langle 12, 11 \rangle$

5) $u = 2i - 2j, v = -i - j$

6) $u = i, v = -2i + 2j$