

## Quiz 7

Key

Math 1060-5

Friday, November 9, 2012

Directions: Show all work for full credit. Clearly indicate all answers. Simplify all mathematical expressions completely. No calculators are allowed.

### Formulas

Law of Cosines:

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\|\mathbf{v}\| = \sqrt{v_1^2 + v_2^2}$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

1. Find angle  $A$  in the triangle with sides  $a = \sqrt{13}$ ,  $b = 3$ , and  $c = 4$ . If necessary, leave the angle in terms of an inverse trigonometric function. (20 points)

We can use the Law of Cosines with the given information to find  $A$ :

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$(\sqrt{13})^2 = 3^2 + 4^2 - 2 \cdot 3 \cdot 4 \cos A$$

$$13 = 9 + 16 - 24 \cos A$$

$$-12 = -24 \cos A$$

$$\cos A = \frac{12}{24} = \frac{1}{2}$$

$$A = \frac{\pi}{3} = 60^\circ$$

2. Find the component form and magnitude of the vector with the initial point  $(1, 6)$  and terminal point  $(-2, 2)$ . (10 points)

The vector in component form is:

$$\mathbf{v} = \langle q_1 - p_1, q_2 - p_2 \rangle = \langle -2 - 1, 2 - 6 \rangle = \langle -3, -4 \rangle$$

Its magnitude is:

$$\|\mathbf{v}\| = \sqrt{v_1^2 + v_2^2} = \sqrt{(-3)^2 + (-4)^2} = \sqrt{9 + 16} = \sqrt{25} = 5$$

3. Carry out each of the following operations: (10 points each) (#21 from 6.3)

(a)  $\langle 2, 1 \rangle + \langle 1, 3 \rangle$

$$\langle 2, 1 \rangle + \langle 1, 3 \rangle = \langle 2 + 1, 1 + 3 \rangle = \langle 3, 4 \rangle$$

(b)  $2\langle 2, 1 \rangle - 3\langle 1, 3 \rangle$

$$2\langle 2, 1 \rangle - 3\langle 1, 3 \rangle = \langle 4, 2 \rangle - \langle 3, 9 \rangle = \langle 1, -7 \rangle$$