

Oregon Institute of Technology Dual Credit Program

Math 112, Spring 2019

Exam 3

Name: _____

Show any relevant work. For each problem, circle your final answer

1. (20 points) Verify each of the following Identities

a. $\tan^2 x + \sec^2 x = 2\tan^2 x + 1$

b. $\cos(\pi + x) - \cos(\pi - x) = 0$ (Use the sum and difference formulas)

2. (20 points) Use the sum and difference formulas to evaluate each of the following expressions.

a. $\cos \frac{7\pi}{12}$

b. $\sin \frac{5\pi}{12} \cos \frac{\pi}{4} - \cos \frac{5\pi}{12} \sin \frac{\pi}{4}$

3. (16 points) Use double-angle or half-angle formulas to evaluate the following expressions.

a. $\cos 2x$, if $\tan x = \frac{20}{21}$ and x is a quadrant III angle.

b. $\sin 105^\circ$

4. (16 points) Find all the solutions to each equation.

a. $2\cos^2 x + \cos x - 1 = 0$

b. $3\tan^2 x - 1 = 0$, $0 \leq x < 2\pi$

5. (12 points) Let $\mathbf{u} = \langle 7, -3 \rangle$, $\mathbf{v} = \langle 2, 5 \rangle$ and $\mathbf{w} = \langle 4, 2 \rangle$. Find each of the following.

a. $5\mathbf{u} - 2\mathbf{v}$

b. $|\mathbf{w}|$

c. $\left| \frac{1}{|\mathbf{w}|} \mathbf{v} \right|$

6. (8 points) Find the horizontal and vertical components of the vector \mathbf{z} with the given length and direction, and rewrite \mathbf{z} in terms of the vectors \mathbf{i} and \mathbf{j} : $|\mathbf{z}| = 8$, $\theta = 60^\circ$

7. (8 points) Find the length ($|\mathbf{t}|$) and direction (θ) of vector \mathbf{t} with the component form: $\mathbf{t} = \langle 0, -5 \rangle$.