

Oregon Institute of Technology Dual Credit Program

Math 112, Spring 2020

Exam 3

Name: _____

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

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

a. $\csc^2 x - \cot^2 x = 1$

b. $\sin\left(\frac{\pi}{2} - x\right) + \sin\left(\frac{\pi}{2} + x\right) = 2 \cos x$ (Use the sum and difference formulas)

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

a. $\sin \frac{5\pi}{12}$

b. $\cos \frac{3\pi}{8} \cos \frac{3\pi}{24} + \sin \frac{3\pi}{8} \sin \frac{3\pi}{24}$

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

a. $\sin 2x$, if $\tan x = -\frac{5}{12}$ and x is a quadrant II angle.

b. $\cos 22.5^\circ$

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

a. $\sin^2 x + 2 \sin x - 3 = 0$

b. $4\cos^2 x - 3 = 0$, $0 \leq x < 2\pi$

5. (12 points) Let $\mathbf{u} = \langle 3, -5 \rangle$, $\mathbf{v} = \langle 1, 4 \rangle$ and $\mathbf{w} = \langle 2, 6 \rangle$. Find each of the following.

a. $3\mathbf{u} - 4\mathbf{v}$

b. $|\mathbf{w}|$

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

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} : $|\mathbf{z}| = 10$, $\theta = 30^\circ$

7. (8 points) Find the length ($|\mathbf{t}|$) and direction (θ) of vector \mathbf{t} with the component form: $\mathbf{t} = \langle -4, 4 \rangle$.