

Name _____

22M:005

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Score (200 possible) _____

Final Exam

Answer each question to the best of your ability. Show all of your work.

1. Solve for all triangles ABC satisfying:
a. $A = 51.20^\circ$; $c = 7896$ cm; $a = 7208$ cm

b. $a = 4.0$ ft, $b = 5.0$ ft, $c = 8.0$ ft

2. Assume $\mathbf{u} = \langle -2, 5 \rangle$ and $\mathbf{v} = \langle 4, 3 \rangle$. Find
a. $2\mathbf{u} + 3\mathbf{v}$

b. $\mathbf{u} \cdot \mathbf{v}$

c. $|\mathbf{u} - 2\mathbf{v}|$

- d. The angle between \mathbf{u} and \mathbf{v} .

3. An airline route from San Francisco to Honolulu is on a bearing of 233.0° . A jet flying at 450 mph on that bearing runs into a wind blowing at 39.0 mph from a direction of 114.0° . Find the resulting bearing and groundspeed of the plane.

4. Given $x = -3 + 2i$ and $y = 5\text{cis}(225^\circ)$

a. Write x in polar coordinates.

b. Find $x * y$ and write the result in polar coordinates.

c. Calculate $\frac{x}{y}$ and write the result in rectangular coordinates.

d. Calculate x^8 and write the result in rectangular coordinates.

e. Calculate all of the fourth roots of y and write the results in polar coordinates.

5. Graph (without using a calculator) the parametric function $x(t)=2\sin t$, $y(t) = \cos t$, for t in $[0, 360^\circ)$

t	$x(t)$	$y(t)$
0°		
30°		
60°		
90°		
120°		
150°		
180°		
270°		
360°		

6. Verify the following identity by hand.

$$\sin \theta + \cos \theta = \frac{\sin \theta}{1 - \frac{\cos \theta}{\sin \theta}} + \frac{\cos \theta}{1 - \frac{\sin \theta}{\cos \theta}}$$

7. Give the exact value of $\cos\left(2\sin^{-1}\frac{2}{5}\right)$.

8. Solve the following equation for x :

$$\cos^{-1} x + \tan^{-1} 1 = \frac{11\pi}{12}$$

9. Graph the function $y = 2 - \sec(x - \frac{\pi}{3})$ over two periods

10. Convert 25° to radians.

11. Given $\sin \theta = \frac{2}{3}$, and θ in quadrant II.

$$\cos \theta =$$

$$\tan \theta =$$

$$\cot \theta =$$

$$\sec \theta =$$

$$\csc \theta =$$

12. The angle of depression from the top of a 252 m high building to a point on the ground is $32^\circ 30'$. How far is the point on the ground from the top of the building?