

Math 112: Final Review:

1. Find the exact value of each of the following. Include a circle sketch and reference triangle.

a) $\csc\left(\frac{5\pi}{4}\right)$

b) $\sin\left(\cos^{-1}\left(-\frac{2}{3}\right)\right)$

2. Find the exact radian measures, in terms of π , of the angles 540° , -225° .

3. You know that $\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$. Explain how this value is found without using a calculator.

4. The cell tower behind the gym casts a shadow that's 85 meters long when the sun hits it at an angle of 32° . What is the height of the tower?

5. A Boeing 747 leaves the Scappoose Airport and flies on a bearing of N 40° W. After $2\frac{1}{2}$ hours the pilot turns to fly on a bearing of N 55° E and flies 4 more hours before landing. If the plane flies at an average of 300 mph, how far is it from Scappoose when it lands?

6. Draw and solve the following triangles. Remember side a is opposite angle A , etc.

a) $A = 44^\circ$, $B = 28^\circ$, $b = 30\text{cm}$

b) $a = 12\text{ft}$, $b = 10\text{ft}$, $c = 9\text{ft}$

7. Find the reference number t and the coordinates of the terminal point determined by t , for the angle $t = \frac{11\pi}{6}$.

8. a) For what values is $\cos(\cos^{-1}(x)) = x$?

b) For what values is $\sin^{-1}(\sin(x)) = x$?

9. For each of the following, sketch one period of the graph carefully.

a) $f(x) = 3 - 2\csc(4x)$

b) $f(x) = 5\cos(\pi x/2 + 1)$

c) $f(x) = \tan(2\pi x)$

10. Verify the following Identities. Use a sum or difference formula

a) $\tan\left(\frac{\pi}{2} - x\right) = \cot(x)$

b) $\sin\left(\frac{\pi}{2} - x\right) = \cos(x)$

11. Use the angle sum or difference formulas to evaluate the following.

a) $\sin(x+y)$ if $\tan(x) = \frac{2}{3}$ and $\cos(x) < 0$ and $\cos(y) = \frac{3}{5}$ and $\tan(y) < 0$

b) $\cos\left(\frac{\pi}{12}\right)$

12. Find all the solutions to the following equations:

a) $\tan^2(x) - 3 = 0$

b) $2\cos(3\theta) - 1 = 0$

13. Let $\mathbf{u} = \langle 2, 4 \rangle$ and $\mathbf{v} = \langle -1, 1 \rangle$. Find each of the following.

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

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

c) $\text{proj}_{\mathbf{v}}\mathbf{u}$

d) $(\mathbf{u} + \mathbf{v}) \cdot (\mathbf{u} - \mathbf{v})$

e) Resolve \mathbf{u} into \mathbf{u}_1 and \mathbf{u}_2 such that \mathbf{u}_1 is parallel to \mathbf{v} and \mathbf{u}_2 is perpendicular to \mathbf{v} .

14. Given the polar point $P: (-5, \frac{5\pi}{6})$, find the rectangular coordinates of P .

15. Sketch the graph of the equation $r = 5\cos \theta$, then convert the polar equation to a rectangular equation.

16. Convert the complex numbers to polar form: $0 \leq \theta < 2\pi$. And find the following

$$z_1 = -4\sqrt{3} + 4i$$

$$z_2 = 1 - i$$

a) $z_1 z_2$

b) z_1 / z_2

17. Use DeMoivre's thm to find the power: $(2 + 2i)^4$.

18. Find all the 5th roots of 1. Graph the roots in the complex plane.