

Here are some practice problems to help you **begin** to study for the final. (This is not a comprehensive list of problem types!)

- Let  $\theta = \frac{7\pi}{6}$ 
  - Sketch  $\theta$  in standard position
  - Determine the reference angle  $\theta'$
  - Convert  $\theta$  to degrees
- Let  $\theta = 310^\circ$ 
  - List a negative coterminal angle between 0 and  $-360^\circ$
  - Convert  $\theta$  to Radians
- Given  $\tan u = \frac{2}{3}$  and  $\sin u < 0$ , evaluate  $\cos u$  and  $\sin u$ . (Hint: draw a reference triangle in the appropriate quadrant.)
- Let  $\cos \theta = \frac{1}{3}$  and  $\sin \theta > 0$ , find  $\sin \theta$  using **trig identities**.
- For  $y = 3 - 2\sin(3x + \pi)$  determine the following
  - Amplitude
  - Period
  - Phase shift
  - Vertical shift.
- Sketch  $y = \csc x$ .
- A guy wire runs from the ground to the top of a 25-foot telephone pole. The angle formed between the wire and the ground is  $52^\circ$ . How far from the base of the pole is the wire attached to the ground.
- Find the area of the sector of a circle with a radius of 18 inches and central angle  $\theta = \frac{2\pi}{3}$ . (Hint:  $A = \frac{1}{2} r^2 \theta$ )
- Evaluate the expression
  - $\arccos\left(\frac{-\sqrt{2}}{2}\right)$
  - $\sin\left(\arccos\left(\frac{-2}{3}\right)\right)$
- Find all solutions of the equation in the interval  $[0, 2\pi)$ 
$$\cos x = \sqrt{2} - \cos x$$
- Find the smallest positive solution of the equation
$$\sqrt{3} \tan 3x = 1$$
- In a triangle, let  $A = 120^\circ$ ,  $a = 12$ , and  $b = 6$ . Find angle B.

13. In a triangle, let  $C = 120^\circ$ ,  $a = 3$ , and  $b = 5$ . Find  $c$ .
14. Find the exact value of  $\sin \frac{u}{2}$  given  $\sin u = \frac{-2}{3}$  and  $\frac{\pi}{2} < u < \pi$
15. Find the exact value of  $\cos 105^\circ$ .
16. A plane is 80 miles north and 80 miles east of Cleveland Hopkins International Airport. What bearing should be taken to fly directly to the airport?
17. Verify the identity
- $$\frac{1}{\sec x \tan x} = \csc x - \sin x$$
18. Let  $\vec{A} = \langle -3, 2 \rangle$  and  $\vec{B} = \langle 1, 4 \rangle$
- Find the magnitude and direction angle  $\theta$  for  $\vec{A}$
  - Find  $\vec{A} - \vec{B}$
  - Find  $\vec{A} \cdot \vec{B}$
  - Find the smallest positive angle between  $\vec{A}$  and  $\vec{B}$  in degrees.
19. Determine the amount of force required to push a 1000-lb riding lawnmower up a ramp that is inclined at a  $40^\circ$  angle
20. The bearing of an airplane is  $40^\circ$  with an airspeed of 240 mph. If the wind is out of the northwest (bearing  $135^\circ$ ) at 30 mph, then what are the bearing of the course and the ground speed of the airplane.
21. Find the area of the triangle in which  $\alpha = 22^\circ$ ,  $b = 12$  ft and  $c = 10$  ft.
22. Let  $z_1 = 4 - 3i$  and  $z_2 = 3 + 3i$
- Write  $z_1$  and  $z_2$  in trigonometric form using degree measure for the argument
  - Find  $z_1 z_2$  and  $\frac{z_2}{z_1}$
  - Evaluate  $(z_1)^4$
  - Find all the 3<sup>rd</sup> roots of  $z_2$
23. Write an equation equivalent to  $x^2 + y^2 + 5y = 0$  in polar coordinates
24. Find a pair of parametric equations whose graph is the line segment joining the points  $(-2, -3)$  and  $(4, 5)$