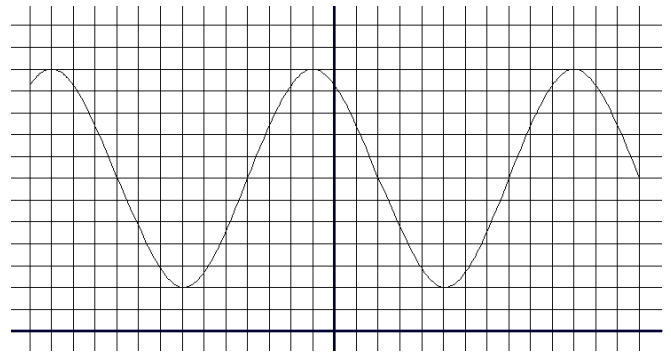


## Sample Math 112 Final Exam Questions

- Sketch a right triangle or use a Pythagorean identity to find the exact value for  $\tan \theta$  if  $\sin \theta = -\frac{6}{9}$  in quadrant III.
- Use the unit circle to find both exact values for  $\theta$  between 0 and  $2\pi$  if  $\cos \theta = -\frac{\sqrt{3}}{2}$  in radians.
- Use a sketch of a right triangle to find the exact value for  $\csc \left( \cot^{-1} \frac{12}{5} \right)$ .
- Find a sine equation for the graph. (each square is 1 unit)

Recall that if  $y = a \sin [b(x + c)] + d$ ;

$a$  = amplitude,  $\frac{2\pi}{b}$  = period,  $c$  = phase shift, and  $d$  = vertical shift.



- $\tan \theta = \left( -\frac{15}{8} \right)$  in the 2<sup>nd</sup> quadrant, find the exact value:  $\sin (2\theta)$
- Verify the identity:  $\frac{\cos^2 \theta - \sin^2 \theta}{\cos \theta} = \sin \theta (\cot \theta - \tan \theta)$
- Simplify the expression:  $\frac{\sec x \cot^2 x}{\csc x \cos^2 x + \sin x}$
- Solve the equation for all values between 0 and  $2\pi$ :  $2\cos \theta = 4\sin \theta \cos \theta$
- Change the rectangular coordinate to a polar coordinate (9,-4)  $0 < \theta < 360^\circ$
- Given that  $x = (v \cos \theta)t$  &  $y = (v \sin \theta)t - 16t^2 + h$ ; where  $t$  is the time in seconds,  $h$  is the arrow's initial height in feet and  $v$  is the arrow's initial velocity in feet per second.  
Find parametric equations to model the flight of an arrow shot 6 feet off the ground at 186 ft/sec at an angle of  $32^\circ$  from the horizontal in order to find the distance it will travel before hitting the ground.
- Solve the triangle:  $a = 12$ ,  $b = 23$ ,  $c = 28$
- Consider force vectors  $\mathbf{u}$  &  $\mathbf{v}$  acting on the same point. Find the resultant magnitude and angle  $\theta$ .  
 $\|\mathbf{u}\| = 340$  pounds,  $\theta = 26^\circ$   
 $\|\mathbf{v}\| = 180$  pounds,  $\theta = 258^\circ$

### Solutions:

- $\frac{2\sqrt{5}}{5}$
- $\frac{5\pi}{6}, \frac{7\pi}{6}$
- $\frac{13}{5}$
- $y = 5 \sin \frac{\pi}{6} (x + 4) + 7$
- $\frac{-240}{289}$
- many answers
- $\cot x$
- $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6}$
- (9.8,  $336^\circ$ )
- $x = 157.74t$  &  $y = 98.56t - 16t^2 + 6$ ; approximately 981 feet
- $A = 24.8^\circ$ ,  $B = 53.6^\circ$ ,  $C = 101.6^\circ$
- $\|\mathbf{r}\| = 269.5$  lbs.,  $\theta = 354.2^\circ$