# Math 143
Final Exam Practice Problems

1. Given the angle $\theta = 12$ radians

   (a) Express θ in terms of degrees, with your answer rounded to the nearest hundredth of a degree.

   (b) Draw θ in standard position

   (c) Convert θ into degree, minute, second form.

   (d) Find one positive angle and one negative angle (in degrees) that are coterminal with θ

2. You are aerating a rectangular lawn that is 40 feet long and 60 feet wide using an aerator whose cylindrical drum is 4 feet wide, and has a radius of 15 inches. If you complete job in the most efficient way possible, how many revolutions will the aerator drum have rotated from the beginning to the end of the job?

3. Find the values of a and b *exactly* based on the triangle below:
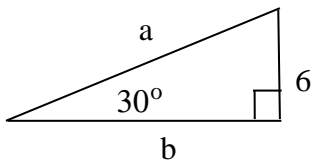
4. Find algebraic expressions for the 6 basic trig functions based on the triangle in the figure below:
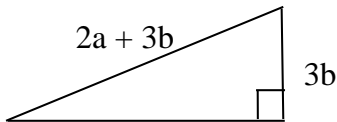
5. Use trigonometric identities to write $\sec\theta$ as a function of $\sin\theta$.

6. Verify the following identities by transforming the left hand side into the right hand side:

   (a) $\tan x \csc x \cos x = 1$

   (b) $\frac{\sin\theta}{1-\cos\theta} = \csc\theta + \cot\theta$

7. Fill in *exact* values in each blank in the table below:

θ (degrees)	θ (radians)	$\sin\theta$	$\cos\theta$	$\tan\theta$
0°				
30°				
45°				
60°				
90°				
180°				
270°				

8. From a point A on a line from the base of the Washington Monument, the angle of elevation to the top of the momument is 42.0°. From a point B 100 feet further away along the same line, the angle to the top is 37.8°. Find the height of the momument to the nearest foot.

9. Given that $\tan\theta = -\frac{7}{12}$ and $\sin\theta < 0$, find the exact value of both $\cos\theta$ and $\csc\theta$.
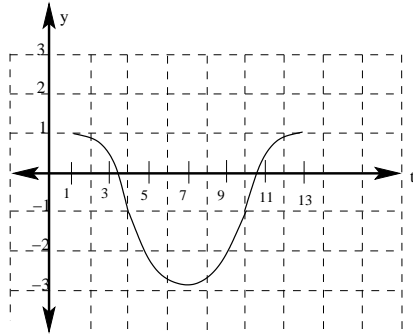
10. Find the *exact* value of the following:

  (a) $\sin(-135°)$

  (b) $\tan(\frac{5\pi}{3})$

  (c) $\cot(540°)$

  (d) $\cos(\frac{5\pi}{12})$

11. Find all solutions to the following equations with $0 \le \theta \le 360°$. Find exact answers whenever possible. Otherwise, approximate your solutions to within .01°

  (a) $\tan\theta = -12$

  (b) $\cos 2\theta = -\frac{1}{2}$

  (c) $3\sin(4\theta - \pi) = -\frac{3\sqrt{3}}{2}$

12. Determine whether the following function are even, odd, or neither:

 (a) $f(x) = x - 2\sin x$

  (b) $g(x) = 4\cos x + x^3$

13. Given the graph:

  (a) Find the amplitude, period, and midline for the graph.

  (b) Express the function shown with an equation of the form: $y = a\sin(bt + c) + d$

  (c) Express the function shown with an equation of the form: $y = a\cos(bt + c) + d$

14. For each function below, find the amplitude and period of the function, and then carefully draw the graph the the function.

  (a) (6 points) $y = 2\sin(3t - \frac{\pi}{3}) + 2$

  (b) (6 points) $y = -3\cos(\frac{1}{3}t - \frac{\pi}{6})$

  (c) (6 points) $y = 4\tan(2t - \pi)$

  (d) (6 points) $y = -3\csc(2t - \frac{\pi}{2}) - 1$

15. Given the indicated parts of the triangle $\triangle ABC$, find all remaining parts. Estimate your answers to within 2 decimal places.
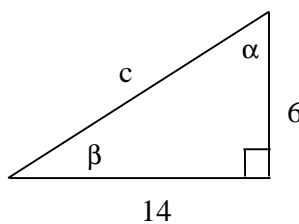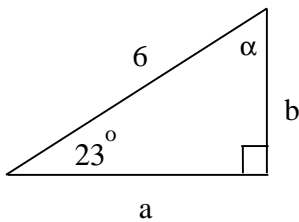
16. Two buildings are 240 feet apart. The angle of elevation from the top of the shorter building to the top of the taller building is $22°$. It the shorter building is 80 feet high, how high is the taller building.