

MONTGOMERY COLLEGE  
Department of Mathematics  
Rockville Campus

MA 105  
Trigonometry

FINAL REVIEW

Revised Fall 2008

1-3. Convert the measure of each angle to exact radian measure.

1.  $15^\circ$       2.  $-225^\circ$       3.  $315^\circ$

4-5. Convert the radian measure of each angle to degree measure.

4.  $\frac{3\pi}{8}$       5.  $1.5$       6.  $5.25$

7. A 15-foot ladder is resting against a wall. The top of the ladder is 14 feet from the ground. What angle does the ladder make with the wall?

8. From a point 300 feet from the base of a Roman aqueduct in southern France, the angle of elevation to the top of the aqueduct is  $78^\circ$ . Find the height of the aqueduct.

9. Find the six trigonometric function values for the angle  $\theta$  whose terminal side passes through point  $P(-8, -5)$ .

10. Use the unit circle to find the exact values of  $\sin \theta$ ,  $\cos \theta$ , and  $\tan \theta$ .

a.  $\theta = \pi$       b.  $\theta = \frac{3\pi}{4}$       c.  $\theta = \frac{5\pi}{6}$

11-14. Use a calculator to evaluate the following expressions to 4 decimal places.

11.  $\sin 127^\circ$       12.  $\cos(-116^\circ)$       13.  $\sec(-4.45)$       14.  $\csc 0.34$

15-19. Find two values of  $\theta$ ,  $0 \leq \theta < 2\pi$ , that satisfy the given trigonometric equation.

15.  $\sin \theta = \frac{1}{2}$

16.  $\cos \theta = -\frac{\sqrt{3}}{2}$

17.  $\tan \theta = -\frac{\sqrt{3}}{3}$

18.  $\tan \theta = 1$

19.  $\sin \theta = -\frac{1}{2}$

20. Graph the following functions and state the domain, range, amplitude, and period.

a.  $y = 2\sin x$       b.  $y = \frac{1}{2}\cos x$

21. Solve the equations for all values in the interval  $0 \leq \theta < 2\pi$ .

- a.  $2 \sin \theta - \sqrt{2} = 0$
- b.  $\cos \theta = 0.6725$
- c.  $2 \cos \theta + 1 = 0$
- d.  $2 \tan \theta + 5 = 0$

22. Use the definition of  $\sin \theta = \frac{y}{r}$ ,  $\cos \theta = \frac{x}{r}$ , and  $\tan \theta = \frac{y}{x}$  to prove the identities.

- a.  $\sin^2 \theta + \cos^2 \theta = 1$
- b.  $\tan \theta = \frac{\sin \theta}{\cos \theta}$
- c.  $1 + \tan^2 \theta = \sec^2 \theta$
- d.  $1 + \cot^2 \theta = \csc^2 \theta$

23. Multiply and simplify.

- a.  $(\sin \theta - \cos \theta)(\sin \theta + \cos \theta)$
- b.  $(\sin \theta - \cos \theta)^2$
- c.  $(1 + \tan \theta)^2$
- d.  $\tan \theta(\cos \theta - \csc \theta)$

Answers

1.  $\frac{\pi}{12}$                       2.  $-\frac{5\pi}{4}$                       3.  $\frac{7\pi}{4}$                       4.  $67.5^\circ$

5.  $85.94^\circ$                       6.  $300.80^\circ$                       7.  $21^\circ$                       8.  $1411 \text{ ft.}$

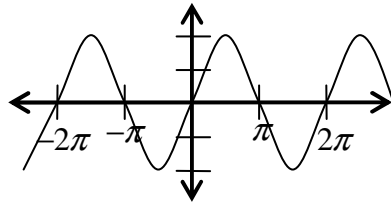
9.  $\sin \theta = \frac{-5}{\sqrt{89}} = \frac{-5\sqrt{89}}{89}$                        $\csc \theta = \frac{-\sqrt{89}}{5}$   
 $\cos \theta = -\frac{8}{\sqrt{89}} = \frac{-8\sqrt{89}}{89}$                        $\sec \theta = \frac{-\sqrt{89}}{8}$   
 $\tan \theta = \frac{5}{8}$                        $\cot \theta = \frac{8}{5}$

10. a.  $\sin \pi = 0$                        $\cos \pi = -1$                        $\tan \pi = 0$   
 b.  $\sin \frac{3\pi}{4} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$                        $\cos \frac{3\pi}{4} = -\frac{1}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$                        $\tan \frac{3\pi}{4} = -1$   
 c.  $\sin \frac{5\pi}{6} = \frac{1}{2}$                        $\cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2}$                        $\tan \frac{5\pi}{6} = -\frac{1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

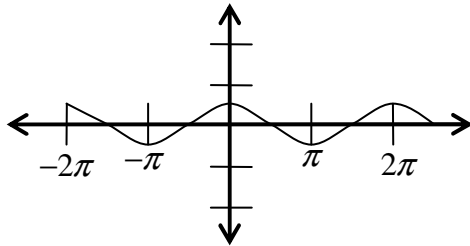
11. 0.7986      12. -0.4384      13. -3.8552      14. 2.9986
15.  $\frac{\pi}{6}, \frac{5\pi}{6}$       16.  $\frac{5\pi}{6}, \frac{7\pi}{6}$       17.  $\frac{5\pi}{6}, \frac{11\pi}{6}$       18.  $\frac{\pi}{4}, \frac{5\pi}{4}$

19.  $\frac{7\pi}{6}, \frac{11\pi}{6}$

20. a. Domain =  $\mathbb{R}$       Range  $-2 \leq y \leq 2$       Amplitude = 2      Period =  $2\pi$



- b. Domain =  $\mathbb{R}$       Range  $-\frac{1}{2} \leq y \leq \frac{1}{2}$       Amplitude =  $\frac{1}{2}$       Period =  $2\pi$



21. a.  $\frac{\pi}{4}, \frac{3\pi}{4}$   
 b. .8332, 5.450  
 c.  $\frac{2\pi}{3}, \frac{4\pi}{3}$   
 d. 1.9513, 5.0929

23. a.  $\sin^2 \theta - \cos^2 \theta$  or  $1 - 2\cos^2 \theta$  or  $2\sin^2 \theta - 1$   
 b.  $1 - 2\sin \theta \cos \theta$   
 c.  $\sec^2 \theta + 2 \tan \theta$   
 d.  $\sin \theta - \sec \theta$