

MONTGOMERY COLLEGE
Department of Mathematics
Rockville Campus

MA 102
Trigonometry

FINAL REVIEW

Revised Summer 2005

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

1. 15° 2. -225° 3. 315°

4-6. Convert the radian measure of each angle to degree measure.

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

7. A 12-foot ladder is resting against a wall and makes an angle of 52° with the ground. Find the height to which the ladder will reach on 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° . Find the height of the aqueduct.

9. Find the six trigonometric function values for the angle θ 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 θ , $0 \neq \theta < 2\pi$, 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 $0 \leq x < 2\pi$.

a. $2\sin x \cos x - \sqrt{2} \cos x = 0$

b. $\sin^2 x - 1 = 0$

c. $2\sin^2 x - 3\sin x + 1 = 0$

d. $2\cos^2 x + 3\cos x + 1 = 0$

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°

5. 85.94°

6. 300.80°

7. 9.5 ft.

8. 1411 ft.

9. $\sin\theta = \frac{-5\sqrt{89}}{89}$

$\csc\theta = \frac{-\sqrt{89}}{5}$

$\cos\theta = \frac{-8\sqrt{89}}{89}$

$\sec\theta = \frac{-\sqrt{89}}{8}$

$$\tan\theta = \frac{5}{8} \qquad \cot\theta = \frac{8}{5}$$

10. a. $\sin\pi = 0$ $\cos\pi = -1$ $\tan\pi = 0$

b. $\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$ $\cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2}$ $\tan \frac{3\pi}{4} = -1$

c. $\sin \frac{5\pi}{6} = \frac{1}{2}$ $\cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2}$ $\tan \frac{5\pi}{6} = -\frac{\sqrt{3}}{3}$

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. $D = R$ Range $-2 \leq y \leq 2$ $A = 2$ $p = 2\pi$

b. $D = R$ $-\frac{1}{2} \leq y \leq \frac{1}{2}$ $A = \frac{1}{2}$ $p = 2\pi$

21. a. $\frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{3\pi}{2}$

b. $\frac{\pi}{2}, \frac{3\pi}{2}$

c. $\frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$

d. $\frac{2\pi}{3}, \frac{4\pi}{3}, \pi$

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. $\sin\theta - \sec\theta$