

Name _____

1. Prove this trigonometric identity. $\cot^2 x - \cos^2 x = \cot^2 x \cos^2 x$

2. Prove this trigonometric identity. $\tan y + \cot y = \sec y \csc y$

3. Consider the trigonometric equation $2 \sin^2 t + 3 \sin t + 1 = 0$.

a. Find all real numbers t between 0 and 2π satisfying the equation.

b. Find all real numbers t satisfying the equation.

4. Find all real numbers t between 0 and 2π satisfying the equation, $4 \sin^2 2t = 3$.

5. Find $\cos(11\pi/12)$ exactly using roots and ratios.

6. Use $\theta = \frac{\pi}{8}$ to demonstrate the relationship between each trig function and its cofunction. (Calculate the value of each and show they are the same.)

7. Prove this trig identity involving addition and subtraction formulas.

$$\sin(u+v) - \sin(u-v) = 2 \cos(u) \sin(v)$$

8. Use a double angle formula to find $\sin(2\pi/3)$ in terms of roots and ratios.

9. a. Use a half angle formula to find $\cos(\pi/12)$.
b. Use a difference formula to find $\cos(\pi/12)$.
c. Show that the two answers are equal.

10. Prove this trig identity involving a double angle formula.

$$4 \sin x \cos^3 x - 4 \cos x \sin^3 x = \sin(4x)$$

11. Solve this equation involving a double angle for all x in $[0, 2\pi]$. $\cos 2x = \cos x$

12. a. Give the domain, range and graph of $y = \cot^{-1} x$.
b. Tell what $y = \cot^{-1} x$ “means”. Specify the acceptable values of x and y for which it is true.

13. Find $\cos^{-1} \frac{\sqrt{3}}{2}$

- a. exactly
- b. by calculator

14. Rewrite this expression involving an inverse function as an algebraic expression in the independent variable x .

$$\sin(\cos^{-1}(x))$$

15. Find $\tan^{-1}(\tan(5\pi/4))$

16. For this parabola $y = -3x^2 + 18x - 32$ do each of the following.

- a. Complete the square to obtain standard form for the equation
- b. Give the reflection, stretching and translation needed to obtain this parabola from the simple parabola $y = x^2$.
- c. draw the box.
- d. draw the graph.
- e. find and label the graph with the vertex, focus and the directrix of the parabola.
- f. give the eccentricity of the parabola.

17. For this ellipse $5x^2 + 16y^2 + 30x - 64y + 29 = 0$ do each of the following.
- Complete the square to obtain standard form for the equation
 - Give the reflection, stretching and translation needed to obtain this ellipse from the simple circle $x^2 + y^2 = 1$.
 - draw the box.
 - draw the graph.
 - find and label the graph with the center, vertices, foci and eccentricity of the ellipse.
 - find the eccentricity of the ellipse.

18. For this hyperbola $25(x+4)^2 - 32(y+3)^2 = 800$ do each of the following.

- a. Obtain the standard form for the equation.
- b. Give the reflection, stretching and translation needed to obtain this hyperbola from the simple hyperbola $x^2 - y^2 = 1$.
- c. draw the box.
- d. draw the graph.
- e. find and label the graph with the center, vertices, asymptotes and foci of the hyperbola.
- f. find the eccentricity of the hyperbola.