Sample Test Problems

1. Reduce the following rational expression to its lowest terms.

$$\frac{12y^2 + 4y^2x^6}{8y^4z^6}$$

2. Find the exact values of $\tan\left(\frac{2\pi}{3}\right)$ and $\csc\left(\frac{2\pi}{3}\right)$.

3. Rewrite $\log_5 \frac{1}{125} = -3$ as an exponential equation.

4. Graph the following circle.

$$4x^2 + 4y^2 + 24x - 8y - 9 = 0$$

5. Suppose that the functions p and q are defined as follows.

$$p(x) = x^2 + 4$$
$$q(x) = \sqrt{x + 5}$$

Find $(q \circ p)(4)$ and $(p \circ q)(4)$.

6. Find all solutions of $8\sin\theta + 4\sqrt{3} = 0$ in the interval $[0, 2\pi)$.
   Write your answer(s) in radians in terms of π.

7. Find the exact value of $\tan\left(\cos^{-1}\left(-\frac{4}{5}\right)\right)$.

8. Solve for x.

$$\log_2(x - 3) = 3 - \log_2(x - 10)$$

9. Use a sum or difference formula to find the exact value of the following.

$$\sin 18° \cos 27° + \cos 18° \sin 27°$$

10. Find the x-intercepts and y-intercepts of the graph of the function.

$$f(x) = -34x^3 - 21x^2 - 30x$$

11. Solve for x.

$$2x^2 + 3y + 14 = (x - 2)^2$$

12. Answer the following.

    (a) Find an angle between $0°$ and $360°$ that is <u>coterminal</u> with $1025°$.

    (b) Find an angle between 0 and 2π that is <u>coterminal</u> with $\dfrac{11\pi}{5}$.

13. Write the following in simplified radical form by rationalizing the denominator.

$$\frac{5}{2+2\sqrt{6}}$$

14. The one-to-one function g is defined below.

$$g(x) = \frac{6x - 6}{-4x - 3}$$

Find $g^{-1}(x)$, where g^{-1} is the inverse of g.
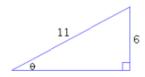Also state the domain and range of g^{-1} in interval notation.

15. Multiply.

$$\frac{3x+6}{x-1} \cdot \frac{x^2+2x-3}{x^2-4}$$

16. Graph the solution to the following inequality on the number line.

    $(x + 1)(x - 4) \geq 0$

17. Find $\cos\theta$, $\sec\theta$, and $\cot\theta$, where θ is the angle shown in the figure.
Give exact values, not decimal approximations.

18. Solve for x.

    $64^{3x-1} = 8^{4x}$

19. Solve for u, where u is a real number.

    $\sqrt{4u - 11} = u - 2$

20. Solve for x.

$$\frac{x+5}{x+2} - 1 = \frac{x-3}{x+5}$$