1. Perform the operation $3x^{\frac{3}{2}}\left(3\sqrt{x} - \frac{8}{\sqrt{x}}\right)$ and simplify as much as possible.

2. Solve the nonlinear inequality $x^2 > 3(x+6)$. Write your answer using interval notation.

3. Find all real solutions of $\frac{3}{x-3} - \frac{6}{x^2} = 0$. Write your answers as a comma-separated list. If there is no real solution write NO REAL SOLUTION and explain.

4. Find an equation of the line that passes through the points $(4,6)$ and $(3,8)$.

5. Find and simplify the difference quotient $\frac{f(a+h)-f(a)}{h}$, where $h \neq 0$ and $f(x) = 6x^2 + 7$.

6. A function is given. $g(x) = \frac{5}{x}; x = 1, x = a$

   (a) Determine the net change between the given values of the variable.

   (b) Determine the average rate of change between the given values of the variable.

7. Sketch the graph of the piecewise defined function

$$f(x) = \left\{ \begin{array}{cl} 4 & \text{if } x \leq -1, \\ x^2 + 1 & \text{if } x > -1 \end{array} \right.$$

8. Sketch the graph of the function $f(x) = -|x-1|$, not by plotting points, but by starting with the graph of a standard function and applying transformations.

9. Use the Inverse Function Property to determine whether f and g are inverses of each other. $f(x) = \frac{1}{x-12}, x \neq 12$; and $g(x) = \frac{1}{x} + 12, x \neq 0$ Explain your answer.

10. Sketch the graph of the function $f(x) = -x^2 + 4x - 3$. Find the coordinates of the vertex and the x- and y- intercepts.

11. A polynomial function is given $g(x) = -x^3 + 3x^2$. Describe the end behavior of g and sketch its graph. Label all x- and y- intercepts on your graph.

12. Evaluate $\log_3\left(\frac{1}{27}\right)$.

13. Solve $4 - \log(7-x) = 3$ for x.

14. Graph the function $y = 3^{(x-3)} - 1$, not by plotting points but by transforming the graph of a more basic function. Show and label all intercepts and asymptotes.

15. Find the exact value of $\sin\left(\frac{29\pi}{6}\right)$.

16. Find $\cos\theta$ if $\sin\theta = -\frac{4}{5}$ and θ is in quadrant IV.

17. Sketch the graph of two complete periods of the function $y = -5\sin(\pi x)$. Label all intercepts, maximums, and minimums.

18. Find $\tan\left(\sin^{-1}\left(-\frac{1}{2}\right)\right)$.

19. Verify the identity $(1 - \sin^2 x)(1 + \tan^2 x) = 1$.

20. Find all solutions to the equation $\sqrt{2}\cos t - 1 = 0$ for t in the interval $-\pi \leq t \leq \pi$.