

1. (4 points) Evaluate $\log_{36} \left(\frac{1}{6}\right)$ and simplify completely.
2. (4 points) Let $f(x) = 7 - 3x - 5x^2$. Simplify $f(2x - 1)$ and write your answer as a polynomial in standard form.
3. (4 points) Find an angle θ coterminal with the angle $\frac{21\pi}{6}$ so that $0 \leq \theta \leq 2\pi$.
4. (4 points) Find the area of the sector of a circle with central angle 12° if the radius of the circle is 3m.
5. (4 points) Rewrite $\frac{-x}{2x-4} + \frac{3x-4}{x^2-4}$ as one reduced fraction.
6. (4 points) Determine the net change and the average rate of change of the function $f(t) = 3t - t^2$ between $t = 2$ and $t = 7$.
7. (4 points) Perform the multiplication $x^{\frac{3}{2}} \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)$ and simplify.
8. (4 points) Suppose $90^\circ \leq \theta \leq 180^\circ$ and $\sin \theta = \frac{2}{9}$. Find $\cos \theta$.
9. (4 points) Sketch the graph the function $f(x) = 2x - x^2$. State the domain, range, and asymptote. Label at least three points on your graph.
10. (5 points) Find an equation of the line passing through the points $(1, -2)$ and $(-5, 3)$.
11. (5 points) Find the center and the radius of the circle with equation $x^2 + 6x + y^2 - 2y + 6 = 0$.
12. (5 points) Simplify $\left(1 + \frac{1}{x}\right)^2 - \left(1 - \frac{1}{x}\right)^2$ completely.
13. (5 points) Solve the equation $V = \frac{1}{3}\pi r^2 h$ for r .
14. (5 points) Sketch the graph of the function $f(x) = -(x - 4)^3$ by indicating how a more basic function has been shifted, reflected, stretched, or compressed. Label all intercepts on the graph and state the end behavior.
15. (5 points) Simplify $\frac{8a^3b^{-4}}{(2a^{-5}b^5)^3}$. Eliminate negative exponents in your final answer.
16. (5 points) Find all real solutions of $(2x - 5)^2 = 81$.
17. (5 points) Evaluate $\sin(-210^\circ)$.
18. (6 points) Given $f(x) = \frac{x-1}{x+1}$ and $g(x) = x^2 + 1$. Evaluate and simplify
 - (a) $g\left(f\left(\frac{3}{2}\right)\right)$
 - (b) $f(g(x))$.
19. (6 points) Perform the indicated operations and simplify as one fraction.
 - (a) $\frac{x^2+2x-3}{x^2+8x+16} \cdot \frac{3x+12}{2x-2}$.
 - (b) $\frac{1}{x-2} + \frac{3}{(x-2)^2}$.
20. (6 points) Solve each of the following for x . If there is no solution, write NO SOLUTION.
 - (a) $5 - x = 14 - \frac{1}{2}x$.
 - (b) $\sqrt{2x+1} + 1 = x$.
21. (6 points) Evaluate and simplify each of the following.
 - (a) $64^{-\frac{1}{3}}$
 - (b) $10^{\frac{2}{7}} \cdot 10^{\frac{19}{7}}$.