1. Find the $x$ and $y$ intercepts for the function $f(x) = x^3 - 9x$.

2. Find the domain of:
   (a) $f(x) = \sqrt{-x^2 - 4x + 5}$
   (b) $g(t) = \ln(4t - 3)$
   (c) $h(x) = \frac{1}{x^3 + 3x^2 - x - 3}$

3. Simplify the expression. Write your answer using positive rational exponents. $\left(\frac{2}{\sqrt[3]{x^5}}\right) (\sqrt[4]{4x})$

4. If we begin with the graph of $f(x) = \sqrt{x}$, shift 4 units to the right, shrink vertically by a factor of $\frac{1}{2}$, and shift upward 10 units, write an equation for the transformed graph.

5. Solve for $x$: $\log(x + 2) + \log(x - 1) = 1$.

6. Factor completely: $3x^2(4x^2 + 1)^8 + 64x^4(4x^2 + 1)^7$.

7. How far from the base of an 18 foot tall pole must a person be standing if the angle of elevation from the ground to the pole is $41^\circ$?

8. Find $f \circ g$ if $f(x) = \frac{x}{x + 1}$ and $g(x) = \frac{2}{x}$. Simplify.

9. Perform the indicated operation and simplify: $\frac{8}{x + 1} - \left(\frac{y}{z + 2} \div \frac{y - 4}{w}\right)$

10. Solve for $x$: $e^{2x} - 2e^x - 3 = 0$.

11. Find the equation of the line passing through the point $(5, 1)$ with slope 7. Next, find $y$ when $x = -4$.

12. If $f(x) = \sqrt{x + 4}$, find and simplify $\frac{f(2 + h) - f(2)}{h}$.

13. Simplify $\frac{(x^2y^4)^5(x^3y)^{-3}}{xy}$.

14. Simplify $\sqrt[3]{a^3b} \sqrt[3]{64a^3b^2}$.

15. Perform the operations and simplify.
   $$\frac{x^2}{x^2 - x - 2} - \frac{4}{x^2 + x - 6} + \frac{x}{x^2 + 4x + 3}.$$
16. Find all zero’s and vertical asymptotes for \( f(x) = \frac{3x^2 - 14x - 5}{4x^2 - 17x - 15} \)

17. If \( \theta \) is in quadrant II and \( \sin \theta = \frac{1}{7} \), what is \( \cos \theta \)?

18. Use properties of logarithms to expand the expression \( \ln \left( \frac{\sqrt{xy^5}}{(z + 1)^4} \right) \).

19. Evaluate \( \sec \frac{2\pi}{3} - \tan \frac{\pi}{6} \).

20. If we begin with a rectangle with length 5 inches and width 4 inches, then increase the length by 8%, what is the change in area?

21. Evaluate \( f(2) - f(-3) \) If \( f(x) = \begin{cases} x^3 + 1 & \text{if } x > 1 \\ 2x^2 - 3 & \text{if } x \leq 1 \end{cases} \)

22. Simplify the expression \( \frac{\cos^2 \theta}{1 + \sin \theta} \).

23. Evaluate \( \log_4 \frac{1}{\sqrt{16}} \).

24. Simplify \( \frac{\frac{1}{a} - b}{\frac{1}{b^4} + a} \).

25. A bacteria culture contains 1200 bacteria and doubles every day. How many hours will it take the culture to reach 10000 bacteria?