1. For each of the following rational functions, be able to find

(a) vertical asymptotes
(b) $x$-intercepts
(c) $y$-intercept
(d) horizontal/slant asymptote
(e) Sketch the graph

(a) $f(x) = \frac{x-3}{x^2-x-2}$
(b) $f(x) = \frac{1}{x^2+5}$
(c) $f(x) = \frac{3x^2-x-2}{x+1}$
(d) $f(x) = \frac{x-3}{x+3}$

2. Sketch the graph of each of the following exponential functions. Also, compute $f(3)$.

(a) $f(x) = 2^x$
(b) $f(x) = 2^{x-4}$
(c) $f(x) = 2^x - 4$
(d) $f(x) = 2^{2x+6}$
(e) $f(x) = e^x$

3. Sketch the graph of each of the following logarithmic functions. Also, compute $f(a)$ for the given value $a$.

(a) $f(x) = \log_3 x, \quad a = 9$
(b) $f(x) = \log_3(x+3), \quad a = -2$
(c) $f(x) = 7 + \log_3 x, \quad a = 3$
(d) $f(x) = \log x, \quad a = 100$
(e) $f(x) = \ln x, \quad a = 4$

4. Expand $\log_3 \left( \frac{x^2 y^4}{z^2} \right)$
5. Expand \( \log_6 \left( \frac{x}{y^5 z^2} \right) \)

6. Write as a single logarithm \( \log_3 x + 4 \log_3 y - 5 \log_3 z \)

7. Write as an exponential equation \( \log_4 5^3 = x \)

8. Write as an exponential equation \( \log_7 a = 14 \)

9. Write as a logarithmic equation \( b^7 = 9 \)

10. Compute \( \log_4 64 \)

11. Compute \( \log_5 625 \)

12. Compute \( \log_4 2 \)

13. Compute \( \log_5 \frac{1}{25} \)

14. Solve each of the following for all variables. Use any method.

   (a) \( 2x - 5y = 6 \)
        \( 4x + 2y = 0 \)

   (b) \( 5x - 5y = 4 \)
        \( 4x - 4y = 5 \)

   (c) \( 3x - 2y + z = 6 \)
        \( x - 2y - 2z = -5 \)

   (d) \( x^2 + y^2 = 10 \)

   (e) \( 25x^2 + 16y^2 = 400 \)

15. Use Gauss-Jordan elimination to solve \( 2x - 5y = 6 \)
        \( 4x + 2y = 0 \)

16. Use Gauss-Jordan elimination to solve \( 2x + y + z = 5 \)
        \( 3x - 2y + z = 6 \)
        \( x - 2y - 2z = -5 \)

17. Use Cramer’s rule to solve \( 2x - 5y = 6 \)
        \( 4x + 2y = 0 \)

18. Use Cramer’s rule to solve \( 2x + y + z = 5 \)
        \( 3x - 2y + z = 6 \)
        \( x - 2y - 2z = -5 \)

19. Let \( A = \begin{bmatrix} 1 & 3 & 3 \\ 2 & 4 & -5 \end{bmatrix} \)
(a) What is the size of \( A \)?
(b) Find \( a_{1,2} \)

20. Let
\[
B = \begin{bmatrix}
1 & 7 & 0 \\
0 & 4 & -5 \\
0 & 2 & -1
\end{bmatrix}
\]

(a) What is the size of \( B \)?
(b) Find \( b_{1,2} \)
(c) Find the determinant.