1. Solve each of the following inequalities.

   a) $(x-2)(x+3) \le 0$ b) $\dfrac{x-2}{x+3} \le 0$ c) $(x-2)\,x\,(x+3) \ge 0$ d) $\dfrac{x-2}{x(x+3)} \ge 0$

2. Find each of the following limits.

   a) $\lim\limits_{x\to\infty} \dfrac{\sqrt{x}}{\sqrt{x+1}-\sqrt{2x}}$ c) $\lim\limits_{x\to 6^-} \dfrac{\frac{1}{x}-\frac{1}{6}}{x-6}$ e) $\lim\limits_{x\to -3^-} \dfrac{x^2-9}{x^2-2x-15}$

   b) $\lim\limits_{x\to-\infty} \dfrac{\sqrt{x}}{\sqrt{x+1}-\sqrt{2x}}$ d) $\lim\limits_{x\to 0} \dfrac{\left(\sqrt{x+25}-5\right)^2}{x^2}$ f) $\lim\limits_{x\to 5^-} \dfrac{x^2-9}{x^2-2x-15}$

3. Find the coordinates of the point(s) where the graphs of $y = x^2+6x+5$ and $y = 12x-3$ intersect.

4. Graph each of the following in the same coordinate system. What symmetry do you notice?

   a) $f(x) = 2^x$ b) $g(x) = \left(\dfrac{1}{2}\right)^x$

5. Graph each of the following.

   a) $f(x) = \dfrac{1}{x}$ b) $f(x) = x^3$ c) $f(x) = x^3 - 4x$

6. Find the inverse for each of the following functions.

   a) $f(x) = 2x-7$ b) $f(x) = \sqrt{3x+1}$ c) $f(x) = \dfrac{2x-3}{5x+1}$

7. Prove that the inverse of a linear function is also linear and the two slopes are reciporcals of each other.

8. Sketch the graph and give a complete analysis for the function $f(x) = \sqrt{x+1}-2$.

9. Simplify each of the following.

   a) $\log_5 125$ d) $\log_{1/100} 10$ g) $\log_{32} 16$ j) $\log_5\left(5^{143}\right)$

   b) $\log_{1/3} 1$ e) $\log_2\left(\dfrac{1}{8}\right)$ h) $\log_3(-3)$ k) $3^{\log_3 7}$

   c) $\log_{10}\left(\dfrac{1}{100}\right)$ f) $\log_{16} 8$ i) $\log_9\left(\dfrac{1}{27}\right)$

10. Use the **definition of the derivative (as limit of the differential quotient)** to compute each of the following derivatives.

    a) $f(x) = x^3 + x$ b) $f(x) = \dfrac{1}{x-2}$ c) $f(x) = \sqrt{2x+1}$

11. Differentiate each of the following.

    a) $f(x) = -4x^3 + x^2 - 6x + 21$ b) $f(x) = x^5 - x^2 - \dfrac{1}{x^2} + \dfrac{1}{x^5}$ c) $f(x) = \sqrt[3]{x^5} - x + \dfrac{1}{e^3}$

12. Find an equation for the tangent line drawn to the graph of $f(x) = 2x^3 + 5x^2 - 20x - 35$ at $x = -3$.

13. Let $L(t) = -t^3 + 21t^2 - 72t + 48$ be the location function of an object, where $t \geq 0$.

    a) Find all values of t where the object is moving upward.

    c) When is the object moving upward with the greatest velocity?

14. Let $L(t) = 3^t$ be the location function of an object. Find an approximation, accurate to at least 3 decimal places, for the velocity of the object at $t = 2$.