1. Solve each of the following inequalities.

   a) $\dfrac{3x+7}{x+5} > 0$ b) $\dfrac{3x+7}{x+5} \geq 0$ c) $\dfrac{3x+7}{x+5} \geq 2$

2. Given $f(x) = \sqrt{x}$ and $g(x) = x^2 - 1$, find each of the following

   a) $f(g(4))$ b) $g(f(4))$ c) $f(g(x))$ d) $g(f(x))$

3. Given $f(x) = \dfrac{2x-1}{x+3}$ and $g(x) = \dfrac{3x+1}{-x+2}$, find each of the following

   a) $f(4)$ b) $g(4)$ c) $f(g(4))$ d) $g(f(4))$ e) $f(g(x))$ f) $g(f(x))$

4. The location of an object, measured in meters, is given by $L(t) = 5t^2 - 3t + 1$, where t is measured in seconds. Find the average velocity of the object between

   a) $t = 2\,\text{s}$ and $t = 2.5\,\text{s}$ b) $t = 2\,\text{s}$ and $t = 2.01\,\text{s}$ c) $t = 2\,\text{s}$ and $t = 2.001\,\text{s}$

5. Which of these equations determine y as a function of x?

   a) $x^2 + y^2 = 4$ d) $x^2 = y^2$ g) $x^2 y = 1$

   b) $x^2 = y$ e) $x^2 + y = 4$

   c) $x = y^2$ f) $2x + 3y = 4$

6. Graph each of the pairs of functions in the same coordinate system. Explain the symmetries you observe.

   a) $f(x) = 2^x$ and $g(x) = \left(\dfrac{1}{2}\right)^x$ b) $f(x) = 2^x$ and $g(x) = \log_2 x$

7. Consider the equation $y = 4mx - 21m + mx^2 + 4$.

   (a) Find all values of m for which the graph $y = 4mx - 21m + mx^2 + 4$ is NOT a parabola.

   (b) Substitute a few values into m and graph the equations. No matter what values we use for m, the graphs will all pass through two fixed points. Find the coordinates of these points.

   (c) Prove that for all values of m, the graph passes through the points you found in part b).

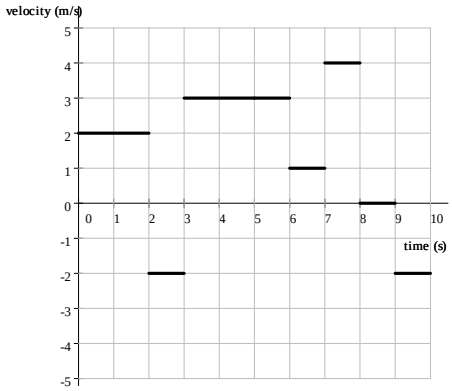
8. Consider the equation $5x + mx + 4x^2 + mx^2 + 1 = 0$. Find all values of m for which the equation has exactly one solution.

9. Consider the equation $y = mx - 3$. For all values of m, the graph is a straight line.

   (a) Find the value of m for which the line passes through the point $(-2, 1)$.

   (b) Find the value of m for which the line $y = mx - 3$ and the parabola $y = \dfrac{1}{2}x^2 + 3x - 1$ have exactly one point of intersection.

10. The picture below shows the velocity function, $v(t)$ of an object. (Time is measured in seconds, distance in meters, velocity in $\frac{\text{m}}{\text{s}}$. Positive direction is upward.).



How far is the object from the starting point at

a) $t = 1$ s b) $t = 3$ s c) $t = 5$ s d) $t = 10$ s

11. Find each of the following limits.

a) $\lim_{x\to-\infty} \frac{1}{x^2-9}$ c) $\lim_{x\to2+} \frac{1}{x^2-9}$ e) $\lim_{x\to-3-} \frac{1}{x^2-9}$ g) $\lim_{x\to-3} \frac{1}{x^2-9}$

b) $\lim_{x\to2-} \frac{1}{x^2-9}$ d) $\lim_{x\to2} \frac{1}{x^2-9}$ f) $\lim_{x\to-3+} \frac{1}{x^2-9}$ h) $\lim_{x\to\infty} \frac{1}{x^2-9}$

12. Find each of the following limits.

a) $\lim_{x\to-\infty} \frac{x^2+3x}{x^2-9}$ d) $\lim_{x\to2} \frac{x^2+3x}{x^2-9}$ g) $\lim_{x\to-3} \frac{x^2+3x}{x^2-9}$ j) $\lim_{x\to3} \frac{x^2+3x}{x^2-9}$

b) $\lim_{x\to2-} \frac{x^2+3x}{x^2-9}$ e) $\lim_{x\to-3-} \frac{x^2+3x}{x^2-9}$ h) $\lim_{x\to3-} \frac{x^2+3x}{x^2-9}$ k) $\lim_{x\to\infty} \frac{x+3}{x^2-9}$

c) $\lim_{x\to2+} \frac{x^2+3x}{x^2-9}$ f) $\lim_{x\to-3+} \frac{x^2+3x}{x^2-9}$ i) $\lim_{x\to3+} \frac{x^2+3x}{x^2-9}$

13. Find each of the following limits.

a) $\lim_{x\to\infty} \left(1-\frac{2}{x}\right)$ b) $\lim_{x\to\infty} \left(\frac{1}{3}\right)^x$ c) $\lim_{x\to5} \frac{\frac{1}{x}-\frac{1}{5}}{x-5}$ d) $\lim_{x\to5} (2x-|x-5|)$

14. Define $f(x)$ is defined as follows: $f(x) = \begin{cases} 3x-8 & \text{if } x<5 \\ -x^2+8x & \text{if } x\geq5 \end{cases}$. Find each of the following limits.

a) $\lim_{x\to5-} f(x)$ b) $\lim_{x\to5+} f(x)$ c) $\lim_{x\to5} f(x)$