Chapter 5 Review Extra Practice

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1. For each function:
   i) Determine the domain and range, intercepts, positive/negative intervals, increasing/decreasing intervals.
   ii) Determine the reciprocal of the original function.
   iii) Sketch both graphs.
   a) $f(x) = 2x - 1$
   b) $f(x) = 5 - 2x$

2. For each pair of functions determine where the zeros of the original function occur and state the equations of the vertical asymptotes of the reciprocal function. If no zeros exist, state so.
   a) $f(x) = 3x - 6$, $g(x) = \dfrac{1}{3x - 6}$
   b) $f(x) = 8x + 10$, $g(x) = \dfrac{1}{8x + 10}$
   c) $f(x) = 5x^2 - 15$, $g(x) = \dfrac{1}{5x^2 - 15}$
   d) $f(x) = x^2 + 3$, $g(x) = \dfrac{1}{x^2 + 3}$
   e) $f(x) = 3x^2 + 14x - 24$, $g(x) = \dfrac{1}{3x^2 + 14x - 24}$

3. For each function, state the equation of the vertical asymptote, if it exists.
   a) $f(x) = \dfrac{3}{3x + 8}$
   b) $f(x) = \dfrac{1 - 4x}{2}$
   c) $f(x) = \dfrac{7 + 5x}{2 - x}$
   d) $f(x) = \dfrac{9x + 3}{2x - 9}$

4. State the horizontal asymptote for each function in Question 3, if it exists.

5. Solve each equation algebraically. Check your answers.
   a) $0 = \dfrac{x - 3}{500}$
   b) $\dfrac{x + 3}{7} = 10$
   c) $\dfrac{5x + 2}{3} = 6 - x$
   d) $-\dfrac{4}{2x + 3} = 1(-2 + 3x)$
   e) $\dfrac{4}{5x} = \dfrac{6}{2x - 1}$

6. Does the equation $\frac{x - 1}{x - 5} = \frac{x}{x - 4}$ have any solutions? If it does, list them. If it does not, explain why.

7. Use an algebraic process to find the solution set of each inequality. Verify your answers using graphing technology.
   a) $\dfrac{1}{x^2} > 0$
   b) $x - 2 < \dfrac{1}{x + 2}$
   c) $\dfrac{100}{x + 20} > -x$

8. Estimate the slope of the line tangent to the function at the given value of x. At what point(s) is it not possible to do so?
   a) $f(x) = \dfrac{x + 10}{x - 20}$, $x = 30$
   b) $f(x) = \dfrac{1}{x + 6}$, $x = -4$
   c) $f(x) = \dfrac{2x}{3x + 4}$, $x = -2$

9. a) Does the instantaneous rate of change exist for the function $f(x) = \frac{x + 4}{x^2 + 2x - 24}$ at $x = -4$? Does it exist at $x = 4$? Explain.
   b) Does the instantaneous rate of change exist for the same function at $x = 4.000\,001$? Explain.