Name: ———————————————————————————   ————— / 25
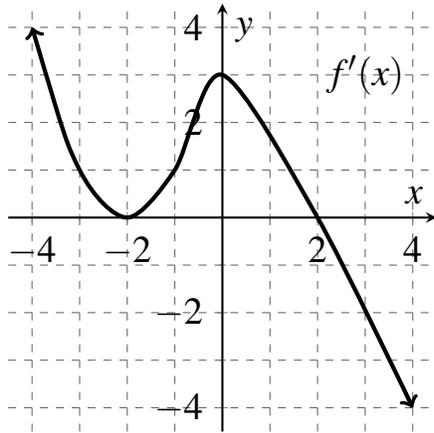
There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. **[5 points]** Below is the graph of the **derivative** of f, $f'(x)$. Use this graph to answer the questions.

   a. On what interval(s) is $f(x)$ increasing?

   b. Determine where $f(x)$ has a local maximum or a local minimum or state that one does not exist.

   c. On what interval(s) is $f(x)$ concave up?

   d. Determine the location of any inflection points of f.

2. **[10 points]** Evaluate the limit. Give the most complete answer possible. If the limit is ∞ or $-\infty$, state this. You must justify your answer algebraically. Answers without any work will not receive full credit.

   a. $\displaystyle\lim_{x \to \infty} \frac{10x^4 - x}{x^2 - 2x^4}$

   b. $\displaystyle\lim_{x \to -\infty} \frac{\sqrt{3x^2 + 1}}{2x^2 - 5}$

3. [10 points] On the axes below, sketch a graph of a function f having all of the given characteristics.

a. $f(-1) = f(3) = 0$

b. $f'(x) < 0$ for $x < 1$

c. $f'(1) = 0$

d. $f'(1) > 0$ for $x > 1$

e. $f''(x) > 0$ for $x < 3$

f. $f''(x) < 0$ for $x > 3$

g. $\lim_{x \to \infty} f(x) = 2$