Name: _____ _____ **/ 25**

Please circle your instructor's name: James Gossell Gordon Williams

There are 25 points possible on this quiz. Any outside materials are not allowed. **For full credit, show all work clearly.**

1. [12 points] The following questions concern the function $f(x) = 2x^3 - x^4$.

a. Find $f'(x)$ and identify all critical points of $f(x)$.

b. Determine intervals where $f(x)$ is increasing or decreasing.

c. Identify the location (x-values) of any local maxima or minima of $f(x)$ or state that none exist.

d. Find $f''(x)$.

e. Determine intervals where $f(x)$ is concave up and concave down.

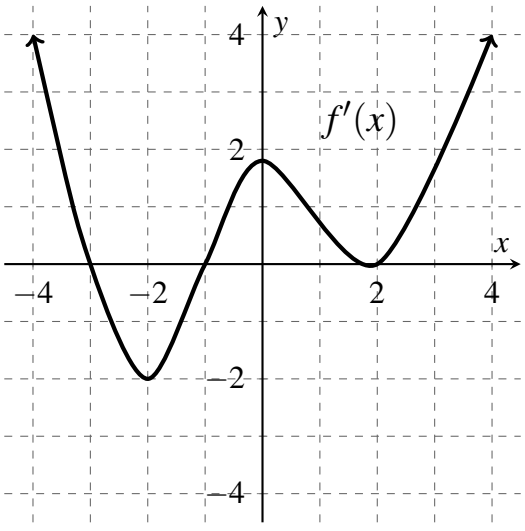
f. Identify the x-values of any inflection points of $f(x)$ or state that none exist.

2. [8 points] Evaluate the given limits. 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. $\lim_{x\to\infty} \dfrac{x^2-2x^4}{10x^4-x}$

b. $\lim_{x\to-\infty} \dfrac{\sqrt{2x^2}}{x-5}$

3. [5 points] Below is the **graph of the derivative of f(x)**. Use this graph to answer the questions $f(x)$.



a. When is $f(x)$ increasing?

b. When is $f(x)$ decreasing?

c. Determine where $f(x)$ has a local maximum or a local minimum.