Name: _____ _____ **/ 25**

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

1. [8 points] Answer the questions below about the function $f(x) = 4x^3 - 3x^4$. Observe that $f'(x) = -12(x-1)x^2$ and $f''(x) = 12x(2-3x)$.

a. Find intervals where f is increasing or decreasing.

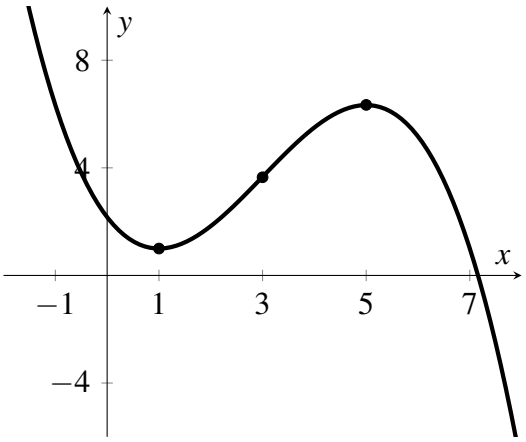
b. Find x-values of any local minima and local maxima of f or state that none exist

c. Find intervals where f is concave up and concave down.

d. Find x-values of any inflection points of f.

2. [3 points] Find any horizontal asymptotes of the graph $H(x) = 5 + \frac{x}{2x+1}$. Show your work.

3. [6 points] Based on the graph of the function $g(x)$ (below) to determine whether each value below is **positive**, **negative**, **zero**, or **undefined**.



a. $g'(1)$

b. $g''(1)$

c. $g'(3)$

d. $g''(3)$

e. $g'(5)$

f. $g''(5)$

4. [8 points] Evaluate the limits below. Use algebra to justify your answer.

a. $\lim_{x\to-\infty} \dfrac{x^4+1}{x^2-2x^3}$

b. $\lim_{x\to\infty} \dfrac{\sqrt{2x^6+x}}{1+x^3}$