NAME:

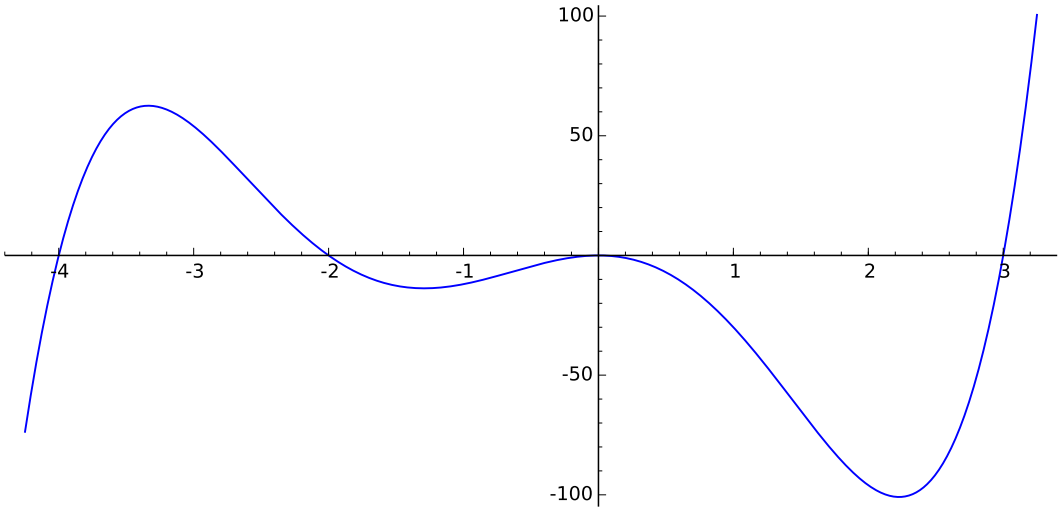
MATH 157 EXAM 3 NOVEMBER 7, 2014

INSTRUCTIONS: Answer all nine of the following problems. Calculators, notes, cell phones, or other materials are not permitted. Show all your work: even correct answers may receive little or no credit if a method of solution is not shown.

1. Sketch the graph of $f(x) = x + \dfrac{4}{x}$. Clearly indicate the location of all axis intercepts, asymptotes, and local extremes (if any exist).

2. Find the absolute maximum and minimum values of $f(x) = x^3 - 3x + 1$ over the interval $[0, 3]$.

3. The graph of the **derivative** of a function f is shown.



$y = f'(x)$

a) What are the critical numbers of f?

d) Determine if each critical number is a local maximum, a local minimum, or neither.

4. A farmer with 160 ft of fence wishes to use the fence to enclose a rectangular area and then divide the area in half by running a length of fence parallel to one of the edges. What is the largest possible total area the farmer can enclose?

5. Find the interval(s) on which the function $f(x) = x^4 - 2x^3 + 3$ is concave downward.

6. Does there exist a continuous function on the interval $[0, 2]$ such that $f(0) = 0$, $f(2) = 7$, and $f'(x) \leq 2$ for all x? Justify your answer.

7. Newton's method with $x_0 = 2$ is to be used to find an (approximate) root of $x^3 - 2 = 0$. Calculate x_2 (there is no need to simplify your answer).

8. Determine the most general antiderivative of the function $g(x) = \dfrac{3}{\sqrt{x}}$.

9. Find f if $f''(x) = \sin x$, $f'(\pi) = 0$, and $f(0) = 1$.