ANS:

b) What are the inflection points of f?

ANS:

c) On what intervals is f decreasing?

ANS:

d) For what x in the range $0 \leq x \leq 100$ does $f(x)$ have a maximum value?

ANS:

e) Assume that $f(25) = 50$. Evaluate $f(50)$.

4.(10) Suppose that at a production level of 2000 for a given product, marginal revenue is \$4 per unit and marginal cost is \$3.25 per unit. Do you expect maximum profit to occur at a production level above or below 2000? Explain your answer in a few sentences.

5.(15) Consider the function $f(x) = x^4 - 4x^3 + 10$

a) Find all critical points of f.

b) Find all local extrema. Tell whether they are local max or local min. Defend your answer by using calculus. (That is, it is not sufficient to say "my calculator says . . . .")

c) Find all inflection points. Show, using calculus, that the points are indeed inflection points.

6.(10) Consider the function $f(x) = x\,e^{-x}$ and its derivative $f'(x) = (1-x)e^{-x}$. Justify your answers to the following questions by using calculus. (It does not suffice merely to draw a picture.)

a) Find the global extrema of f on the interval $-1 \leq x \leq 4$.

MAX:

MIN:

b) Find the global extrema of f on the interval $2 \leq x \leq 4$.

MAX:

MIN:

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1.(30 points) Computations

a) $Q(t) = 4t - \frac{1}{2}e^{2.4t}$ $\quad Q'(t) =$

b) $h(t) = \ln(e^{-t} + 3t)$ $\quad h'(t) =$

c) $y = (x^2 + 4)^4\sqrt{3x+1}$ $\quad dy/dx =$

d) $\int 12x^5 + \frac{4}{x}\,dx =$

e) $\int e^{-.05t}dt =$

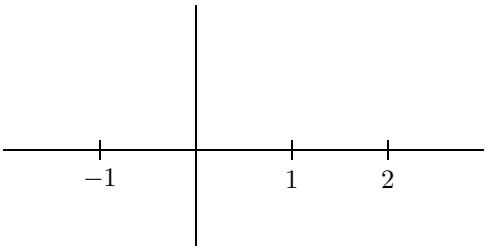
f) Use the Fundamental Theorem of Calculus to evaluate

$\int_{-1}^{2} (3x^2 - 6)\,dx =$

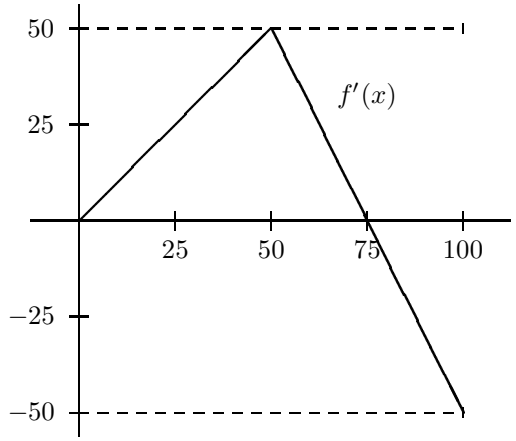
2.(10) Sketch the graph of a function f given the following information.

$f'(x) > 0$ for $x < -1$, $f'(-1) = 0$, $f'(x) < 0$ for $x > -1$ except that $f'(1)$ is undefined;

$f''(x) < 0$ for $x < 1$, $f''(1)$ is undefined (of course), $f''(x) > 0$ for $x > 1$.



3.(25) The graph show the derivative, f', of a mystery function f.



a) What are the critical points of f?