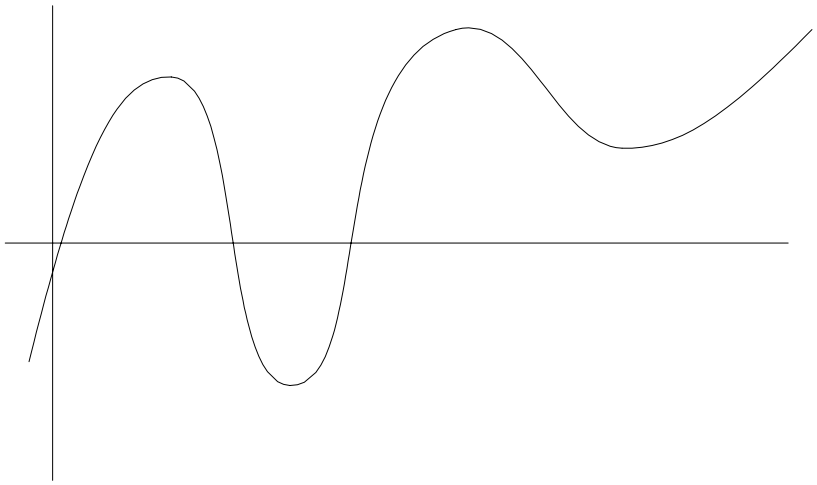
Mathematics 122 Test #2 Name: _____

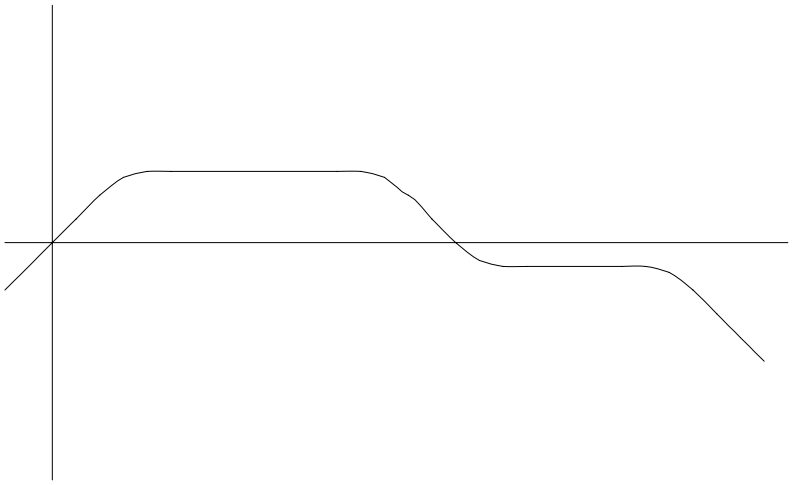
You are to use your own calculator, no sharing.
Show your work to get credit.

(1) (10 points) For the following functions draw the graph of the derivative on the same axis.

(a)



(b)



(2) (5 points) Draw a possible graph for a function given the following information.

- $f'(x) > 0$ for $1 < x < 4$,
- $f'(x) < 0$ for $x < 1$ and $x > 4$.

(3) (15 points) Let $f(x)$ have values as given in the following table.

x	0	2	4	6	8
$f(x)$	22	28	32	30	26

(a) Make a table of values of $f'(x)$.

(b) Make a table of values for $f''(x)$.

(c) Give a approximation of the value of $f'(2.8)$.

$f'(2.8) \approx$ _____

(4) (10 points) A cold drink is left out in a warm room. Let $f(t)$ be the temperature, in degrees Celsius, of the drink t minutes after being left out.

(a) Do you expect $f'(t)$ to be positive or negative? Give a reason for you answer.

(b) What are the units of $f'(t)$?

(5) (10 points) Draw graphs of functions with the following properties

(a) $f'(x) < 0$, $f''(x) < 0$

(b) f is increasing at an increasing rate.

(c) $f(1) = 2$, $f'(1) = 0$, $f''(x) < 0$.

(6) (10 points) Find the equation of the tangent line to $y = x - x^3$ at the point where $x = 2$.

_____

(7) (5 points) Let $f(x) = \dfrac{e^x}{\sqrt{x^2+1}}$. Then use your calculator to compute $f'(3.1)$.

$f'(3.1) =$ _____

(8) (10 points) For some painkillers, the size of the dose, D, given depends on the weight of the patient, W. Thus $D = f(W)$, where D is in milligrams and W is in pounds.

(a) Interpret $f(140) = 120$ and $f'(140) = 3$ in terms of this painkiller.

(b) Use the information in part (a) to estimate $f(145)$.

$f(145) \approx$ _____

(9) (30 Points.) Find the derivatives of the following functions.

(a) $y = 4x^3 - 7x^2 + 5x - 9$

$y' =$

(b) $z = \dfrac{3}{t^2} + 5\sqrt{t} + e^{\pi}$

$z' =$

(c) $A(r) = 3e^r + 19(3.2)^r$

$f'(t) =$

(d) $Q = 4\ln(P)$

$\dfrac{dQ}{dP} =$

(e) $V(r) = 2e^{3r} + (r^3 + r)^4$

$V'(r) =$

(f) $y = 4\ln(2x+1)$

$y' =$

(g) $y = 5e^{2x^3}$

$y' =$

(h) $y = xe^x$

$y' =$

(i) $w = \sqrt{z^2+z} - 2\ln(3z^2+z)$

$w' =$

(j) $y = \dfrac{x^2+1}{x+1}$

$y' =$