

Math 250
Exam Two - 11/3/08

Directions. Put your name in the upper left-hand corner of this page. Your work must provide complete justification of your answers (unless stated otherwise). You can do whatever you want with your calculator, but I will grade your work as if you only used your calculator to do computations like $\ln(\frac{98}{37})$ or $965^{6.891}$. So, though you may use your calculator to do things other than such computations, you must show your work for these other things.

(1) (10 points) Consider the table

t	5	10	15	20	25	30	35
$P(t)$	68	75	88	102	113	124	141
$P'(t)$	2	3.1	3.8	4.6	6	7.2	8.3
$P''(t)$	1	1.4	2.3	3.1	3.4	4.1	5.1

(a) What is a reasonable estimate for the value of $P(26)$? (b) Give a reasonable estimate of $P'(16.2)$.

(2) (7 points) Consider the graph of $y = f(x)$ given below.

Using the graph of f and what can be deduced from it about f' (for example, whether $f'(x)$ is positive, zero, or negative), draw a reasonable and quality graph of $f'(x)$, with domain $(-7, 7)$.

(3) (4 points each; only your final answer will be graded) For each of the following functions, compute the derivative. You do not have to simplify your answers. For each function, write your final answer just to the right of the original function and draw a box around it.

(a) $y = \frac{1}{3x^2} + 5x - 12.37$

(b) $y = 6x^5 + 3x^3 + 3x^{(-\frac{13}{2})} - 41$

(c) $Q(t) = (4.32)^{(t^4+12t^2+19)}$

(4) (6 points each) For each of the following functions, compute the derivative. You do not have to simplify your answers. For each function, write your final answer just to the right of or just below the original function and draw a box around it.

(a) $y = 12(5x^4 + e^{(x^2+16)} + \ln(x))^{12}$

(b) $h(t) = (t^{-3} + 22t)(4t^4 - 3t^3 + t^2)$

(5) (6 points each) For each of the following functions, compute the derivative. You do not have to simplify your answers. For each function, write your final answer just to the right of or just below the original function and draw a box around it.

(a) $g(x) = (2x^5 - 4x^3 - 23)(x^4 + e^{(x^3+19x^2)} + \ln(x^2 + x))$

(b) $W(x) = \frac{e^{2x} + e^{5x}}{2x^6 + 12x^2 + 2}$

- (6) (8 points) Let $f(x) = 2e^x - 4x^3$. Find the equation of the line that is tangent to the graph of $f(x)$ at $x = 1.16$. Write the equation of the tangent line in the form $y = ax + b$. Your values of a and b must be correct to two decimal places.

- (7) (8 points) Let $f(x)$ and $g(x)$ be functions such that

$$\begin{aligned} f(1) &= 10, & f'(1) &= -3, & f(3) &= -4, & f'(3) &= -9, \\ g(2) &= 1, & g'(2) &= 5, & g(4) &= 3, & g'(4) &= 7. \end{aligned}$$

Compute the value of

$$\left. \frac{d}{dx}(f(g(x))) \right|_{x=4}.$$

(8) (5 points) Consider the following graph of $f(x)$.

Beside each expression below, write whether it is positive, negative, or zero.

- (a) $f''(-4)$
- (b) $f''(3)$
- (c) $f''(8)$