

MATH 103 200710 Problem Set 3

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Thursday, February 1, 2007

The following problems from chapters 1.6, 1.7, and 1.8 may appear on the test on Thursday, February 8.

1. Evaluate the following derivatives using the sum, constant multiple, and generalized power rule:

(a) $f(x) = 3\sqrt{3x^4 + x + 1}$

(b) $g(x) = \frac{1}{2x + 5}$

(c) $h(x) = \left(x + \frac{1}{x}\right)^{-2}$

2. Suppose $f(3) = 6$, $f'(3) = 1$, $g(3) = -2$, and $g'(3) = 7$. Find $h(3)$ and $h'(3)$ where $h(x) = 5f(x) - 4g(x)$.
3. Suppose $g(1) = 5$ and $g'(1) = -3$. Find $f(1)$ and $f'(1)$ where $f(x) = 2\sqrt{g(x)}$.
4. The tangent line to the curve $y = (x + 1)^3$ has slope 75 at two points on the curve. Find the two points.
5. Find the following second derivatives:

(a) f'' where $f(x) = (1 - 3x^2)^2 + x^4$

(c) $g''(1)$ where $g(x) = \frac{1}{x - 3}$

(b) $\left. \frac{d^2}{dx^2} (x^5 + 3x^2) \right|_{x=2}$

(d) $h''(x)$ where $h(x) = ax^2 + bx + c$

6. Let $C(x)$ be the cost (in dollars per day) of manufacturing x bicycles per day in a certain factory. Suppose we know that $C(50) = 5000$ and $C'(50) = 45$. Estimate the cost of manufacturing 55 bicycles.
7. Suppose $f(25) = 10$ and $f'(25) = -2$. Estimate $f(27)$, $f(26)$, $f(25.25)$, $f(24)$, and $f(23.5)$.
8. Let $S(x)$ represent the total sales (in thousands of dollars) for the month x in the year 2005 at a certain department store. Represent each statement below by an equation involving S and/or S' :
- (a) The sales at the end of January reached \$120,560 and were rising at the rate of \$1500 per month.
- (b) At the end of March, the sales for the month dropped to \$80,000 and were falling by about \$200 per day. (Use 1 month = 30 days.)

Please do the following problems from the textbook. They may appear on Midterm Test 1.

- 1.6 C-level: 1–44, B-level: 45–59, 61–62; A-level: 60, 63–64;
- 1.7 C-level: 1–32, 37–40; B-level: 33–34, 41–42; A-level: 35–36;
- 1.8 C-level: 23–28; B-level: 29–31.