## Business Calculus I (Math 221) Exam 3

Date: November 23, 2016

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Justify answers and show all work for full credit.

NAME: \_\_\_\_\_

**Problem 1.** Suppose x and y satisfy  $4\sqrt{x} + xy^3 - 2 = x^2 - 6y$ . Find  $\frac{dy}{dx}$  at the point (4,1).

**Problem 2.** Find the derivatives  $\frac{dy}{dx}$ .

(a) 
$$y = \ln(7x^3 - 9x - 3)$$

**(b)** 
$$y = e^{(-4x+3)} + \frac{9}{x} - 3$$

(c) 
$$e^{6y} + \ln(y) = \frac{5}{\sqrt{x}} + x$$

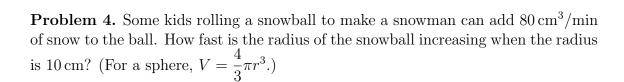
Problem 3. Evaluate

(a) 
$$\int 3x^4 + \frac{2}{x^6} + \frac{4}{x} - 10 \ dx$$

**(b)** 
$$\int 4x^{3/5} - 3e^{7x} - \sqrt[3]{x} + \frac{13}{x^4} dx$$

(c) 
$$\int x^4 \sqrt{2x^5 + 3} \ dx$$

(d) 
$$\int \frac{3x^8}{x^9 - 2} \, dx$$



**Problem 5.** The wind blows a kite 80 ft above the ground at 10 ft/sec parallel to the ground. How fast must the string be let out when the string is 100 ft long?

**Problem 6.** Suppose a bond that now costs \$2,000 will return \$5,000 in 30 years.

- (a) If compounded continuously, what is the interest per year (APR) on the bond?
- (b) How much will the bond be worth after 10 years?

**Problem 7.** To produce x flerds, the marginal cost in dollars is  $\overline{MC} = 4x + 30$ , and the marginal revenue is  $\overline{MR} = 110$ . The fixed cost for making flerds is \$1,000.

- (a) Find the marginal profit function  $\overline{MP}(x)$ , where x is the number of flerds.
- (b) Find the profit function P(x) for flerds.
- (c) After how many flerds, if ever, will selling flerds be profitable? Explain.