MATH 211 Bogacki

Spring 99

Sample Test 2

1. Given $y = x\cos y$, find $\dfrac{d^2y}{dx^2}$ in terms of x and y.

2. A point moves along the x - axis so that its position x at time t is specified by the function $x = t^3 - 6t^2 + 9t + 1$. Determine
(a) the time intervals on which the point is moving to the right,
(b) the time intervals on which the point is accelerating to the right,
(c) the time intervals on which the point is speeding up.

3. Gas escapes from a spherical balloon at the rate of 20 cubic feet per minute. How fast is the radius changing at the instant the radius is 2 feet?

4. Find the absolute maximum and minimum of the function $f(x) = 2x^3 - 9x^2 - 3$ on the interval $[\,-1\,,\,1\,]$.

5. You have 2000 feet of fencing to enclose a rectangular field, separated by two lengths of fencing down in the middle so that the field is separated into three equal rectangular areas. Find the largest rectangular area you can enclose.

6. An open box is to be made from a square piece of material, 12 inches on the side, by cutting equal squares from each corner and turning up the sides. Find the dimensions of the box of maximum volume.

7. Find $\dfrac{dy}{dx}$:

(a) $y = e^{2x} + \ln x^2$

(b) $y = e^{\sin^2 x}$

(c) $y = \tan(\ln x)$

(d) $y = \ln \dfrac{5x^2 + 2x + 1}{x^2 - x + 1}$

(e) $y = \log_2(3x + 1)$

(f) $y = 4^{x - \cos x}$

(g) $y = x^x$

(h) $y = (\sin x)^{\cos x}$

8. Find $\dfrac{dy}{dx}$ and <u>simplify</u>:

(a) $\ln|\cos x|$

(b) $\ln|\csc x + \cot x|$