

Math 111-H03, Problem Set 2, 9 Oct 2007

Be sure to carefully show all work. Hand in Problems 2,3,5,7.

Problem 1 Find equations of tangent and normal to

$$y = x^3 - 2x^2 + 4 \text{ at } (2, 4)$$

Problem 2 Use the definition of the derivative to find the derivative of

$$\text{a) } f(x) = \sqrt{2x-1} \quad \text{b) } f(x) = \frac{1}{x+1} \quad \text{c) } f(x) = x^{2/3}$$

Problem 3 Use the definition of the derivative to check the formula:

$$\frac{d}{dx}[xf(x)] = f(x) + xf'(x)$$

Problem 4 A ball is dropped from a height s_0 and is two-thirds of the way to the ground after three seconds. When does the ball hit the ground? What was the height s_0 ?

Problem 5 A baseball is caught by an outfielder six seconds after it is hit. Estimate the maximum height reached by the ball.

Problem 6 Which point on the line $y = x$ is closest to the point $(3, 0)$? Which point on the parabola $y = x^2$ is closest to the point $(3, 0)$?

Problem 7 Find a line that is tangent to both of the following parabolas:

$$y = -x^2 \text{ and } y = 2x^2 + 1.$$