

Math 220 AD9, Spring 2009, Quiz 3

Name: Answer Key

1. (Q. 3, p. 187) Find the derivative of the product below:

$$f(x) = (\sqrt{x} + 3x)(5x^2 - \frac{3}{x}).$$

Two functions multiplied together  $\rightarrow$  Product Rule.

$$\frac{d}{dx}(u(x)v(x)) = u(x)\frac{dv}{dx} + v(x)\frac{du}{dx}$$

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

$$f'(x) =$$

$$(x^{\frac{1}{2}} + 3x)(10x + 3x^{-1}) + (5x^2 - 3x^{-1})(\frac{1}{2}x^{-\frac{1}{2}} + 3)$$

2. (Q. 22, p. 156) Find the equation of the tangent line to

$$f(x) = \frac{x}{x+1}, \text{ One function divided by another } \rightarrow \text{Quotient Rule}$$

at  $x=0$ .  $\frac{d}{dx}\left(\frac{u(x)}{v(x)}\right) = \frac{v(x)\frac{du}{dx} - u(x)\frac{dv}{dx}}{(v(x))^2}$  (Learn This!!)

$$f'(x) = \frac{(x+1) \cdot 1 - x(1)}{(x+1)^2} = \frac{1}{(x+1)^2}$$

Tangent line to  $f(x)$  at  $x=0$

Thus slope  $f'(0) = \frac{1}{(0+1)^2} = 1$ . (NOT  $\frac{1}{(x+1)^2}$ )

Goes through point  $(0, f(0)) = (0, 0)$ .

Equation of tangent line is

$$y - 0 = 1(x - 0)$$

or  $y = x$ .