Math 141 Worksheet 5

1. Find the derivative $f'(x)$.

$$f(x) = \csc x(8x^5 + 2x^3 + 7)$$

2. Find the derivative $f'(x)$.

$$f(x) = \left(\frac{x + \sin x}{6x^4 - x^2 + 3}\right)^5$$

3. Find the derivative $f'(x)$.

$$f(x) = \cos(\sin(\tan(3x^2)))$$

4. Find the derivative $f'(x)$.

$$f(x) = \cos^3(2x) + \sqrt{5x^2 + 7x}$$

5. Find the derivative $f'(x)$.

$$f(x) = \sqrt[3]{\tan^2 x - 5x^3}$$

6. Find the derivative $f'(x)$.

$$f(x) = \sin^2(5x)\sec(4x^3)$$

7. Find the derivative $f'(x)$.

$$f(x) = \frac{x^3\cos(5x)}{3x^5 - 4x^3 + 1}$$

8. Find the *second* derivative $f''(x)$.

$$f(x) = \sin(5x)\cos(2x)$$

9. Find $\frac{dy}{dx}$ if the following equation holds.

$$xy^2 + 2y(x+2)^2 + 2 = 0$$

10. Find $\frac{dy}{dx}$ if the following equation holds.

$$3(7x+4y)^5 + \sin(x^3 y) = 1$$

11. The area of a circular doggie puddle is growing at a rate of 12 cm^2/sec. How fast is the radius growing at the instant when it equals 10 cm? Give units.

12. One train is 15 miles east of Denver and is traveling west at 110 mph, while a second train is 20 miles north of Denver and is traveling north at 90 mph. Calculate the rate at which the distance between the trains is changing. Give units. Are the trains moving closer to one another or farther away?

13. The dimensions of a box are 10 in, 12 in, and 20 in. If the shorter sides are decreasing at a rate of 0.2 in/min and the longest side is increasing at a rate of 0.5 in/min, calculate the rate at which the volume is changing. Give units. Is the volume increasing or decreasing?