

Spring 2012 Math 151

Week in Review # 4

sections 3.2, 3.3, 3.4

courtesy: Joe Kahlig

Section 3.2

Find the derivative of these functions.

1. $y = \pi^5$

2. $y = x^3 + 5x + 10$

3. $y = \sqrt[4]{x^3} + \sqrt{x^5} - x$

4. $y = x^3(x^5 + 2x^3 + 7x + 5)$

5. $y = \frac{7}{3x^5}$

6. $y = \frac{7x^3 - 5x + 2}{x^2}$

7. $y = \frac{x^3 + 2}{x^2 - 5}$

8. $y = \frac{1 + f(x)}{x^3}$, where $f(x)$ is a differentiable function.

9. Find the equation of the tangent line to the curve $f(x) = \frac{7x}{x+3}$ at $x = 2$

10. Find the values of x where the tangent line to the function $f(x) = x^3 + 3x^2 - 4x + 10$ is parallel to the line $y = 20x + 3$.

11. Find the point(s) on the function $f(x) = \frac{4}{x}$ where the tangent line goes thru the point $(1, -5)$.

12. Find $k'(x)$ when $k(x) = \begin{cases} x^3 - 2x + 1 & \text{if } x < 2 \\ x^2 + 5x - 9 & \text{if } x \geq 2 \end{cases}$

13. Does $k'(3)$ exist? Explain why or why not. $k(x) = \begin{cases} x^3 - 10x + 2 & \text{if } x < 3 \\ 3x^2 - x & \text{if } x \geq 3 \end{cases}$

Section 3.3

14. A particle is moving in straight line motion. Its position can be given by $s(x) = x^3 - 9x^2 + 24x + 2$, where s is measured in meters and x is measured in seconds.
- (a) At what times is the particle at rest?
 - (b) When is the particle moving in the positive direction?
 - (c) Find the total distance traveled from $x = 0$ to $x = 6$.
 - (d) Find the displacement from $x = 0$ to $x = 6$.

15. Compute the following limits.

- (a) $\lim_{x \rightarrow 0} \frac{\sin^2 6x}{5x^2}$
- (b) $\lim_{x \rightarrow 0} \frac{\sin 2x}{\sin 5x}$
- (c) $\lim_{x \rightarrow 0} \frac{\cos(2x) - 1}{\tan(4x)}$
- (d) $\lim_{x \rightarrow 5} \frac{\sin(2x - 10)}{3x - 15}$

Trig. Derivatives Rules

$$\frac{d}{dx} \sin(x) = \cos(x)$$

$$\frac{d}{dx} \cos(x) = -\sin(x)$$

$$\frac{d}{dx} \tan(x) = \sec^2(x)$$

$$\frac{d}{dx} \csc(x) = -\csc(x) \cot(x)$$

$$\frac{d}{dx} \sec(x) = \sec(x) \tan(x)$$

$$\frac{d}{dx} \cot(x) = -\csc^2(x)$$

Find the derivative of these functions.

16. $y = \sec(x) + \cos(x)$

17. $f(x) = x^4 \sin x$

18. $f(x) = \frac{\tan x}{1 + \cos x}$

19. $y = \csc x - 5 \cot x$

20. Find the equation of the tangent line for

$$f(x) = \sec x - 2 \cos x \text{ at } x = \frac{\pi}{3}$$