

REVIEW WS: SECTIONS 3.3-3.4

****YOU MUST SHOW ALL WORK ON A SEPARATE SHEET OF PAPER****

SECTION 3.3

1) True, False:

a) For $f(x) = -5, f'(x) = 0$.

b) For $f(x) = x^6, f'(x) = 6x$.

c) For $f(x) = 2^x, f'(x) = x2^{x-1}$.

2) Find $f'(x)$ for each:

a) $f(x) = 10$

b) $f(x) = x^{-3}$

3) Find $f'(x)$ for each:

a) $f(x) = 5x^4$

b) $f(x) = x^4 + 4x^3$

c) $f(x) = 7x^3 + 6x^2 + 10x + 12$

d) $f(x) = x^{-7} - x^{-6}$

e) $f(x) = x^\pi$

f) $f(x) = 3x^3 - 6x^{-2}$

g) $f(x) = (x + 1)^2$

4) Suppose the position of a particle along an axis at time t is $f(t) = t^2 + \frac{1}{t}$ ft. Find the velocity of the particle at time $t = 2$ seconds.

5) For $f(x) = mx + b$, find $f'(x)$. What does this say about the tangent line to $f(x)$ at any point?

6) Find $f'(x)$ for each:

a) $f(x) = 5x^4(x + 1)$

b) $f(x) = (x^2 + x)(3x + 1)$

c) $f(x) = \frac{x^3}{x^2 + 10}$

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

e) $f(x) = \frac{\sqrt{x} - 1}{\sqrt{x} + 1}$

f) $f(x) = x^2e^x$

7) Find $f'(x)$ for $f(x) = \frac{1}{x^2}$ two ways:

a) by the Power Rule

b) by considering $\frac{1}{x^2}$ as a quotient.

8) Find $f'(x)$ for $f(x) = 4x^3$ using the product rule.

SECTION 3.4

1) $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x} = \underline{\hspace{2cm}}$.

2) Find $\lim_{x \rightarrow 0} \frac{1}{x \cot x} = \underline{\hspace{2cm}}$.

3) Find $\lim_{x \rightarrow 0} \frac{x^2}{2 \sin x}$.

B. These six differentiation formulas *must* be memorized.

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

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

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

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

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

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

4) Find y' for each:

a) $y = \sin x - \cos x$

b) $y = \frac{\tan x}{x + 1}$

c) $y = \sin \frac{\pi}{4}$

d) $y = x^3 \sin x$

e) $y = x^2 + 2x \cos x$

f) $y = \frac{x}{\sec x + 1}$

g) $y = \frac{x}{\cot x}$

5) Find where the graph of

$f(x) = \sqrt{3} \sin x + 3 \cos x$ has a horizontal tangent.