

## CH 2

## 2.1 – 2.2

1) Show proper work in finding each of the following limits, if they exist. If the limit does not exist, state as such and show why.

a)  $\lim_{x \rightarrow 4} (2x^2 - 11x + 5)$

b)  $\lim_{x \rightarrow -1} \frac{x^2 - 2x - 3}{x^2 + 6x + 5}$

c)  $\lim_{x \rightarrow \infty} \frac{x^2 + 7x + 10}{8x - 3x^2}$

d)  $\lim_{x \rightarrow \infty} \frac{8x - 7}{6x^2 - 5x + 9}$

## 2.4

1) **Use the Definition of the Derivative** to determine the derivative of the function below. You may double check by other techniques, but no credit given for other techniques.

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$f(x) = 6x^2 - 3x + 5 \quad \text{or} \quad f(x) = \sqrt{6x+7} \quad \text{or} \quad f(x) = \frac{7}{4x-3}$$

## 2.5

1) Find the Derivative of each of the following

a)  $f(x) = 2x^6 - 3x^4 + 5x + 7$

b)  $y = \sqrt{x} + \sqrt[5]{x}$

c)  $g(x) = \frac{6}{\sqrt[3]{x}}$

d)  $k(x) = \frac{1}{x} + \frac{3}{x^4}$

e)  $h(x) = (x^2 - 3x)(4x + 5)$

f)  $q(x) = \frac{3x^5 - 4x^2 + 7}{x^2}$

2) Find the Slope-Intercept Equation of the line Tangent to each given function at the specified  $x$ -value.

a)  $f(x) = 2x^2 - 7x + 5$  at  $x = 4$

b)  $f(x) = \sqrt{2x-1}$  at  $x = 5$

c)  $f(x) = x^3 - 6x + 3$  at  $x = 2$

## 2.6

1) Demand for Widgets based on price is given by:  $D = 150000 - 4p^2$ .

(Hint:  $\Delta y = f(x_0 + \Delta x) - f(x_0)$  and  $dy = f'(x_0)\Delta x$  )

- a) **Estimate** the Change in Demand if the price,  $p$ , is changed from  $p = 80$  to  $p = 90$
- b) Find the actual(or exact) Change in Demand if the price,  $p$ , is changed from  $p = 80$  to  $p = 90$
- c) **Estimate** the Change in Demand if the price,  $p$ , is changed from  $p = 120$  to  $p = 108$

## 2.7

1) Given the Cost and Revenue functions below, do the requested tasks

$$C(x) = 30000 + 160x \quad R(x) = 500x - 0.8x^2$$

- a) Find the Marginal Revenue function: \_\_\_\_\_
- b) Find the estimated change in Revenue from the 141<sup>st</sup> item \_\_\_\_\_
- c) Find the Profit function: \_\_\_\_\_
- d) Find the Marginal Profit function: \_\_\_\_\_
- e) Find the estimated change in Profit from the 161<sup>st</sup> item \_\_\_\_\_

2)

## CH 3

### 3.1

1) Use the Continuous Compounding of Interest formula as needed:

- a) How much will \$7500 be worth in 8 years at 4.25% compounded continuously
- b) How much must be invested by the Munroe's today such that they will have \$80,000 in 18 years to send their newborn baby to college if they can invest it at 5.3% continuously compounded?
- c) How long does it take for \$3000 to grow to \$11000 at 4.5% continuously compounded?

### 3.2

1) Find the Derivative of each of the following

- a)  $f(x) = \ln x$
- b)  $y = e^x$
- c)  $g(x) = \ln 8x$
- d)  $f(t) = e^{-0.04t}$

## 3.3

1) Find the derivatives of the following functions.

a)  $y = x^4 e^{x^2+1}$

b)  $h(x) = \frac{5x+6}{x^2+1}$

c)  $y = x^2 \ln(6x)$

d)  $h(x) = \frac{3x^2+4}{x^2-1}$

## 3.4

a)  $F(x) = \ln(x^4 + 3x^2 + 7)$

b)  $F(x) = e^{3x^2+5x}$

## 3.5

1) Use Implicit Differentiation to find  $dy/dx$

a)  $6x^4 + y^5 = 3x^2 + 7y + 8$

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

2) Use Implicit Differentiation to find  $dy/dx$  at  $(2,3)$  for:  $6x + y^2 + 6 = 3x^2 + 5y$

## 3.6

1) The Price-Demand relationship for daily contracts of oil and the price per barrel of oil is given as:

$$p = 2500 - 0.04x^2, \quad 0 \leq x \leq 250$$

a) If the rate of change in the price of a barrel of oil is decreasing by \$3/week, at what **rate is demand changing** when 100 contracts are being ordered?

b) If the rate of change in demand is an increase in 10 contracts per week, what is the **rate of change in price** when 100 contracts are being ordered?

### 3.7

1) Construct the Elasticity function,  $E(p)$ , for the given Price-Demand function and then use it to answer the questions which follow.

$$x = f(p) = 500 - 0.08p^2$$

a) What is the Elasticity at  $p = 20$ ?

b) What is the Elasticity at  $p = 60$ ?

2) Construct the Elasticity function,  $E(p)$ , for the given Price-Demand function and then use it to answer the questions which follow

$$x = f(p) = 1200 - 3p^2$$

a) What is the Elasticity at  $p = 16$ ?

b) What is the Elasticity at  $p = 5$ ?

## CH 4

### 4.1

1) Given the function below, follow the steps below.

a) Find all Critical Points, in Coordinate form.

b) Show work/reasoning in determining Intervals of Decrease and Intervals of Increase

c) Determine whether each Critical Point is a Relative Minimum, Relative Maximum, or Neither.

i)  $f(x) = -2x^3 + 3x^2 + 36x + 11$

ii)  $f(x) = 6x^4 + 8x^3 + 7$