**Basic Calculus Spring 2014 – Final Exam Review (Part 2 of 2):**

**Part 2:**

**VI) Tangent Lines and Implicit Differentiation**

**VII) Absolute Maximum and Minimum on a closed Interval**

**VIII) Revenue, Cost, and Profit equations**

**IX) First and Second Derivative Tests**

**X) Integration**

Part 1:

I) Limits

II) Continuity

III) Definition of the Derivative

IV) Derivatives

V) Compound Interest

**Part 2:**

**VI) Tangent Lines and Implicit Differentiation:**

Find the Equation of the tangent line to the functions:

at

at

at

Find the point(s) where the tangent line to the functions is horizontal:

Differentiate to find , then find the equation of the tangent line to the curve at (1,1)

Differentiate to find , then find the equation of the tangent line to the curve at (1,2)

Differentiate to find , then find the equation of the tangent line to the curve at (-1,0)

Differentiate to find , then find the equation of the tangent line to the curve at (2,1)

Differentiate to find , then find the equation of the tangent line to the curve at (0,0)

Use implicit differentiation to find the equation of the tangent line to the curve at for the curve:

Find the equation of the tangent line at to the graph of: .

Find the equation of the tangent line to: at .

Find the equation of the tangent line to the function: at .

Find the equation of the tangent line for the function: at .

Differentiate to find , then find the equation of the tangent line to the curve at (0,-1)

Differentiate to find , then find the equation of the tangent line to the curve at (1,1)

Differentiate to find , then find the equation of the tangent line to the curve at (-1,2)

**VII) Absolute Maximum and Minimum on a closed Interval:**

For the function

Find the absolute maximum and minimum on the interval [-2,10];

Given the cost function

Find the absolute maximum and minimum on the interval [0,4];

For the function

Find its absolute maximum and minimum on the interval from [4,7];

The profit function is given as

Find the absolute maximum and minimum on the interval [-5,5];

For the given function

Find the absolute maximum and minimum on the interval [-3,0];

For the given function

Find the absolute maximum and minimum on the interval [0,3];

On the interval find the absolute maximum and minimum of

Find the extremum of on the interval ;

Find the absolute maximum and minimum of on ;

Find the extremum on the interval of

For the function

Find the absolute maximum and minimum on the interval [-2,4];

**VIII) Revenue, Cost, and Profit equations:**

The price-demand equation and cost functions for the production of space ships is given by and respectively, where “x” is the number of space ships produced at price “p” per ship.

a) Find the revenue and profit equations:

b) Find the marginal revenue and marginal profit functions:

c) Calculate and interpret this value:

d) Find the approximate and exact profit of the 7th space ship being produced:

The “we are robots company, inc.” has determined that their current sales price of humanoid robots is not earning them their maximum profit. Their senior sales associate finds that current price-demand equation is; . The associate also knows that their current production cost for these robots is; .

Using this information find the current Revenue and Profit functions:

Based on this information find the Marginal Revenue and Profit functions:

How many robots should be produced to maximize Profit and what is the maximum Profit?

What is the average Profit per robot when the maximum profit is obtained?

Compare the exact Profit and the approximate Profit received from producing the 1200th robot?

The world health operation (W.H.O.) is funding a project to combat deadly viruses.

The cost of funding the anti-pandemic entity is; , where “x” represents the number of batches of vaccines produced.

Find the marginal cost of funding this project:

What is the minimum cost of the project?

Interpret the marginal cost at a production level of 100 batches of vaccines:

What is the exact cost of producing the 99th batch?

What is the approximate cost of producing the 99th batch?

Mechanical rabbits sell for the price of KD when rabbits are sold. If the cost of selling rabbits is , write the functions for:

The revenue and profit equations:

Find the number of rabbits to be sold to maximize profit and then find the maximum profit:

Interpret P’(10):

Compare the exact and approximate Profit of the 9th Rabbit:

The selling price of a ticket on a space flight is bitcoins when tickets are sold. If the cost of selling tickets is , find the following:

a) The revenue and profit equations:

b) The marginal profit and the number of tickets to be sold to maximize profit:

The department of research at the international supersonic engine development center has determined that their the current price , in KD, based on the quantity demand , is; . They have also discovered that their operating cost is .

a) Find the revenue and profit functions:

b) Determine how many engines they need to sell in order to maximize their profit:

c) What is the maximum profit?

d) At what price should they sell the engines in order to maximize their profit?

A CFO at the Bank of Lost Springs, WY, has figured that offering checking accounts has a fixed yearly cost of $50 and each checking account costs them $10 per year. He also knows that the price-demand for such accounts is .

a) Find the revenue and profit equations:

b) Find the marginal revenue then find the marginal revenue when 3 accounts are open and interpret the value:

c) How many accounts need to be opened in a year to maximize revenue and what is the maximum revenue?

**IX) First and Second Derivative Tests:**

Given: , find:

a) The Domain;

b) The y – intercept;

d) The critical value(s); (first derivative test)

e) The intervals where the function is increasing and decreasing:

f) The minimum and maximum values (extremes):

g) The inflection point(s); (second derivative test)

h) The intervals where the function is concave up and concave down:

i) Sketch the graph:

Consider the function:

a) Find the domain:

b) Find the y-intercept:

c) Find the intervals on which is increasing and decreasing:

d) Find the local maximum and minimum of :

e) Find the inflection points of :

f) Find the intervals on which is concave up or down:

g) Sketch the graph of :

Given:

a) Find the domain:

b) Find the y-intercept:

c) Find the intervals on which is increasing and decreasing:

d) Find the local maximum and minimum of :

e) Find the inflection points of :

f) Find the intervals on which is concave up or down:

g) Sketch the graph of :

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c) Find the intervals on which is increasing and decreasing:

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c) Find the intervals on which is increasing and decreasing:

d) Find the local maximum and minimum of :

e) Find the inflection points of :

f) Find the intervals on which is concave up or down:

g) Sketch the graph of :

Given:

Find:

a) The Domain:

b) The Vertical Asymptote(s):

c) The Horizontal Asymptote:

d) The x & y – intercepts:

e) The critical value(s): (first derivative test):

f) The interval where the function is increasing and decreasing:

g) The minimum and maximum values (extremes):

h) The inflection point(s): (second derivative test):

i) The interval where the function is concave up and concave down:

j) Sketch the graph;

Given:

Find:

a) The Domain:

b) The Vertical Asymptote(s):

c) The Horizontal Asymptote:

d) The x & y – intercepts:

e) The critical value(s): (first derivative test)

f) The interval where the function is increasing and decreasing:

g) The minimum and maximum values (extremes):

h) The inflection point(s): (second derivative test)

i) The interval where the function is concave up and concave down:

j) Sketch the graph;

Given:

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a) The Domain:

b) The Vertical Asymptote(s):

c) The Horizontal Asymptote:

d) The x & y – intercepts:

e) The critical value(s): (first derivative test):

f) The interval where the function is increasing and decreasing:

g) The minimum and maximum values (extremes):

h) The inflection point(s): (second derivative test):

i) The interval where the function is concave up and concave down:

j) Sketch the graph;

Given the function:

a) State the Domain of

b) Find the y-intercept:

c) Find the extremum (the local maximum and minimums) of the function and state where the function is increasing and decreasing:

d) Find the inflection points and state where the function is concave up and down:

e) Sketch the graph of the function:

Given the function:

a) State the Domain of

b) Find the y-intercept:

c) Find the extremum (the local maximum and minimums) of the function and state where the function is increasing and decreasing:

d) Find the inflection points and state where the function is concave up and down:

e) Sketch the graph of the function:

Given the function:

a) State the Domain of

b) Find the asymptotes of the function:

c) Find the x and y -intercepts:

d) Find the extremum (the local maximum and minimums) of the function and state where the function is increasing and decreasing:

e) Find the inflection points and state where the function is concave up and down:

f) Sketch the graph of the function:

Given the function:

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c) Find the x and y -intercepts:

d) Find the extremum (the local maximum and minimums) of the function and state where the function is increasing and decreasing:

e) Find the inflection points and state where the function is concave up and down:

f) Sketch the graph of the function:

**X) Integration:**

Suppose the marginal cost equation is given as . If the cost of producing 5 units is 20KD, find the total cost function,

Suppose the marginal revenue equation is given as . If the cost of producing a unit is 5KD, find the total revenue function,

Given the function and , find