Test Name: homework1(Test)

**1.**  It costs a toy retailer $10 to purchase a certain doll. He estimates that, if he charges dollars per doll, he can sell dolls per week. Find a function for his weekly profit.

f(x) = -10(80-2x) + x(80-2x)

**2.**  Given the following function:

**Step 1.** Find .

**Step 2.** Find .

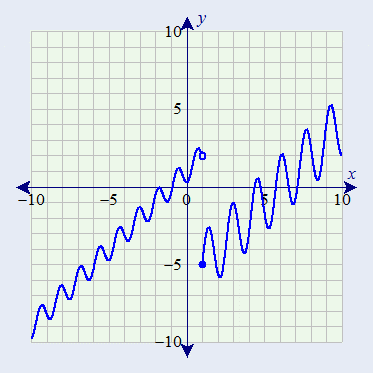
**Step 3.** Find .

**3.**  Use the graph to find the indicated limits. If there is no limit, state "Does not exist".

**Step 1.** Find  
. = 2

Does Not Exist

A)



Answer:

**Step 2.** Find  
. = -5

**Step 3.** Find  
. = A) Does Not Exist

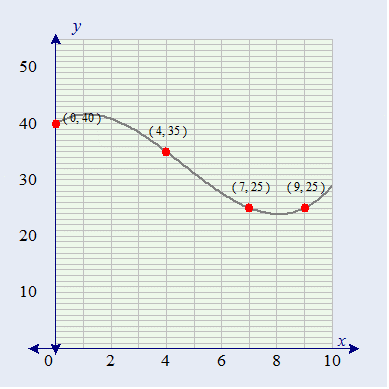
**4.**  Find the derivative for the following function.

**5.**  Find the derivative for the following function.

**6.**  Find the derivative for the following function.

**7.**  Find the derivative for the following function.

**8.**  Consider the graph of . What is the average rate of change of from to ? Please write your answer as an integer or simplified fraction.



(35-40)/(4-0) = -5/4

Answer:

**9.**  The cost of producing *x* baskets is given by . Determine the average cost function.

**10.**  Use the Product Rule or Quotient Rule to find the derivative.

**11.**  Use the Product Rule or Quotient Rule to find the derivative.

**12.**  Find the derivative for the given function. Write your answer using positive and negative exponents and fractional exponents instead of radicals.

**13.**  After a sewage spill, the level of pollution in Sootville is estimated by , where is the time in days since the spill occurred. How fast is the level changing after days? Round to the nearest whole number.

**14.**  The average home attendance per week at a Class AA baseball park varied according to the formula where *t* is the number of weeks into the season and *N* represents the number of people.

**Step 1.** What was the attendance during the third week into the season? Round your answer to the nearest whole number.

2510

**Step 2.** Determine and interpret its meaning. Round your answer to the nearest whole number.

The rate of change in attendance in week 5 is +20 people.

**15.**  Consider the following function:

**Step 1.** Use implicit differentiation to find .

**Step 2.** Find the slope of the tangent line at .

**16.**  Find the intervals on which the following function is increasing and on which it is decreasing.

The function is not increasing, but it decreases from

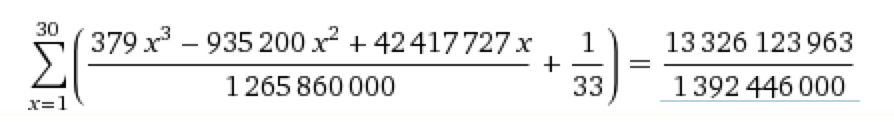
**17.**  A frozen pizza is placed in the oven at . The function approximates the temperature (in degrees Fahrenheit) of the pizza at time .

**Step 1.** Determine the interval for which the temperature is increasing and the interval for which it is decreasing. Please express your answers as open intervals.

The temperature is not decreasing, but it increases from . We find this because of the shape of the graph and the global min of F(0)=14.

**Step 2.** Over time, what temperature is the pizza approaching?

**18.**  A study says that the package flow in the East during the month of November follows , where is the day of the month and is in millions of packages. What is the maximum number of packages delivered in November? On which day are the most packages delivered? Round your final answer to the nearest hundredth.



The maxium number of packages delivered in November is 9.57 million.

On Nov. 23rd the most packages are delivered (local max).

**19.**  Use the Second Derivative Test to find all local extrema, if the test applies. Otherwise, use the First Derivative Test. Write any local extrema as an ordered pair.

(-2,-63)

**20.**  Use the Second Derivative Test to find all local extrema, if the test applies. Otherwise, use the First Derivative Test. Write any local extrema as an ordered pair.

(-2, -204) and (5, 825)

**21.**  A beauty supply store expects to sell 120 flat irons during the next year. It costs to store one flat iron for one year. To reorder, there is a fixed cost of , plus for each flat iron ordered. In what lot size and how many times per year should an order be placed to minimize inventory costs?

S(x) = 1.6 \* (x/2)

R(x) = (4.5x + 6) \* (120/x)

IC(x) = 1.6 \* (x/2) + (4.5x + 6) \* (120/x) 0 < x <= 120

IC’(x) = 0.8-720/x^2 IC’(0) = 30

To minimize inventory costs, each lot size should have 30 flat irons and the order should be placed 4 times a year.

Reference: [Brief Calculus for the Business, Social, and Life Sciences by Bill Armstrong, Don Davis.](https://books.google.com/books?id=T2dmnv3o8BIC&pg=PA360)

**22.**  A shipping company must design a closed rectangular shipping crate with a square base. The volume is . The material for the top and sides costs $3 per square foot and the material for the bottom costs $5 per square foot. Find the dimensions of the crate that will minimize the total cost of material.

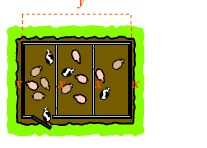
18432ft^3 = x^2 \* y

C = 5\*x^2 + 3x^2 + 4xy C = 8x^2 + 4\*(18432/x)

Xmin = 8 \* 3^(2/3) y = 32\*3 ^ (2/3)

The height should be 32 \* 3 ^ (2/3) feet, the sides should be 8 \* 3 ^(2/3) feet.

**23.**  A farmer wants to build a rectangular pen and then divide it with two interior fences. The total area inside of the pen will be . The exterior fencing costs and the interior fencing costs . Find the dimensions of the pen that will minimize the cost.



yards

*y =*

yards

*x =*

1056 = xy

C = 14.40 \* 2y + 14.40 \* 2x + 12.00 \* 2x

C = 14.40 \* 2(1056/x) + 14.40 \* 2x + 12.00 \* 2x

Xmin = 24

**24.**  It is determined that the value of a piece of machinery declines exponentially. A machine that was purchased 7 years ago for $67000 is worth $37000 today. What will be the value of the machine 9 years from now? Round your answer to the nearest cent.

37000 = 67000e^(7k)

k = 1/7(log(37))-log(67))

$17,244.50 = 9 yrs

**25.**  The demand function for a television is given by dollars. Find the level of production for which the revenue is maximized.

R(x) = x\*D(x)

R(x) = 23.2x – 0.4x^2

Global max = 29

**26.**  The amount of goods and services that costs $ on January 1, costs $ on January 1, . Estimate the cost of the same goods and services on January 1, 2017. Assume the cost is growing exponentially. Round your answer to the nearest cent.

426.8=400e ^ (11k)

k = 0.00589554

$455.40 = 22 yrs

**27.**  A manufacturer has determined that the marginal profit from the production and sale of clock radios is approximately dollars per clock radio.

**Step 1.** Find the profit function if the profit from the production and sale of clock radios is $1700.

**Step 2.** What is the profit from the sale of 56 clock radios?

$5,156

**28.**  Use integration by substitution to solve the integral below.

**29.**  It was discovered that after *t* years a certain population of wild animals will increase at a rate of animals per year. Find the increase in the population during the first 9 years after the rate was discovered. Round your answer to the nearest whole animal.

**30.**  Find the area of the region bounded by the graphs of the given equations.

Enter your answer below.

**31.**  Solve the differential equation given below.

**32.**  Use integration by parts to evaluate the definite integral below.

Write your answer as a fraction. -144/5

**33.**  The following can be answered by finding the sum of a finite or infinite geometric sequence. Round the solution to 2 decimal places.

A rubber ball is dropped from a height of meters, and on each bounce it rebounds up % of its previous height.

**Step 1.** How far has it traveled vertically at the moment when it hits the ground for the time?

71.95 meters

**Step 2.** If we assume it bounces indefinitely, what is the total vertical distance traveled?

71.95 meters

**34.**  Find the Taylor polynomial of degree near for the following function.