Name: _____ **TC**

Classwork 50

Checklist for solving Max/Min problems with calculus:

1) Define the variables
2) Write an equation relating the variables
3) Write a formula or function for what you want to maximize or minimize
4) Isolate one variable
5) Substitute so that the function in (3) has only one variable it depends on
6) Take the derivative
7) Set the derivative equal to zero
8) Solve for x

1. Lily is thinking of 3 numbers. The lowest number and the middle number add to 15. The highest number is twice as big as the smallest number. What is the minimum product these numbers could have?

a) Give some examples and make a chart. For example, if the lowest number is 5...

b) Use calculus to find the exact answer.

1)

2)

3)

4)

5)

6)

7)

8)

2. The Rowing Team is selling T-shirts for $15 each. Sales are averaging 10 shirts a day. The team lowers the price to $13 each and the sales go up to 11 shirts a day.

a) If the relationship between price and sales is linear, write an equation which describes how sales (y) depend on price (x).

b) Write an equation describing how revenue (r) depends on price (x).

c) What price will give the team **maximum *revenue***?

d) Let's say each shirt costs the team $6. Calculate the **profit** the team makes from selling shirts:

i. at $15 each

ii. at $11 each

e) Write an equation describing how profit (p) depends on price (x).

f) What price should the team charge to maximize their ***profits***?

3. In economics, demand is usually more hyperbolic. When the student council decides to have a bake sale to raise money for the senior prom, the calculus class decides that a more reasonable model of the relationship between **sales (y)** and **price (x)** would be $y = 25/x^2$

a) Sketch the graph of the relationship between sales and price in the first quadrant. Label your axes.

b) What is the **limit** of the sales function as the **price** of cake goes to ∞?

c) What is the **limit** of the sales function as the **price** of cake goes to 0 ?

d) Fill out the chart showing the sales that this equation predicts for each price.

PRICE	# of slices SOLD	Revenue	Costs	Profit
$0.10				
$0.25				
$0.50				
$1.00				
$2.00				
x				

e) What price will give the maximum **sales?**

f) What price will give the maximum **revenue?**

g) Let's say each piece of cake costs the senior class $0.20 to make. Fill out the chart showing the cost & profit that would be expected at any given price. What price do you predict will maximize profits?

h) Given the equation relating price to profit, use calculus to find exactly what price the senior class should set in order to maximize profits.