Name: _____ **TC**

Classwork 46

1. (warm up) Find the maximums and minimums of the function $y = 1/2x^4 - 6x^3 + 14x^2 - 5$

A reminder...

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

2. Two positive numbers multiply to give 50. Minimize their sum.

a) Give some examples. What do you think the answer will be near?

b) Use calculus to find the exact answer.

3. What point on the hyperbola $y = 1/x$ is closest to the origin?

a) Draw a graph on the calculator and hypothesize what the answer should be. (Zoom in near the origin)

b) Use calculus to find the exact answer.

4. 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) If each shirt costs the team $6, write an equation describing how profit (p) depends on price (x).

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

5. 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) What is the **limit** of this function as the **price** of cake goes to ∞?

b) What is the **limit** of this function as the **price** of cake goes to 0 ?

c) Let's say each piece of cake costs the senior class $0.20 to supply. Write an expression for the **profit** gained from each individual piece of cake sold.

d) Write an equation relating **total profit (p)** to **price (x).**

e) Given this equation, what price should the senior class set in order to maximize profits?