Notes/Classwork: Optimization Day 3 Application of Derivatives

1. Suppose a company makes a profit of  makes and sells 𝑥>0 items. How many items should it make to maximize profit?

2. A farmer has 2400 ft of fencing and wants to fence off a rectangular field that borders a straight river. He needs no fencing along the river. What are the dimensions of the field that has the largest area?

3. Find the point on the parabola  that is closest to the point (1,4).

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4. A rectangular storage container with open top is to have a volume of 10  . The length of its base is twice the width. Material for the base costs $10 per square meter. Material for the sides costs $6 per square meter. Find the cost of materials for the cheapest such container.

5. A farmer has 400 feet of fencing to make three rectangular pens. What dimensions 𝑥 and 𝑦 will maximize the total area?

6. What dimensions minimize the surface area of a can with volume 16𝜋 cubic inches?

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7. A painter has enough paint to cover 600 square feet of area. What is the largest square-bottom box that could be painted (including the top, bottom, & all sides)?

8. Suppose the profit of a company is when it makes  items a day. What level of production will maximize profits?

9. Four pens will be built along a river by using 100 feet of fencing. What dimensions will maximize the area? Assume no fencing is needed along the river.

10. A rectangular pen will be built using 100 feet of fencing. What dimensions will maximize the area?

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11. A box with a square bottom will be built to contain 40,000 cubic feet of grain. The sides of the box cost 10 cents per square foot to build, the roof costs 1 dollar per square foot to build, and the bottom will cost 7 dollars per square foot to build. What dimension will minimize the building costs?

12. Find the area of the largest rectangle that can be inscribed in a semicircle of radius 2

