

Math 1231: Single-Variable Calculus 1
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Recitation 10

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Problem 1. If we have 1200 cm^2 of cardboard to make a box with a square base and an open top, what is the largest possible volume of the box?

- (a) What are we trying to do? What is our objective function?
- (b) What constraints are we acting under?
- (c) Use our constraints to get a single-variable function to optimize.
- (d) Find the optimum value.
- (e) How do we know this is really the largest possible answer?

Problem 2. A pizzeria sells pizzas for \$10 per pizza, and it costs $2x + x^2$ cents to make x pizzas. How many pizzas should the pizzeria make to maximize profit, and how much profit will it make?

- (a) What is your objective function?
- (b) Is there a constraint here? What?
- (c) Make a single-variable function and find the critical points.
- (d) Answer the question. How do we know when we have a maximum or minimum?

Problem 3. A piece of wire 10 m long is going to be cut into two pieces. We will fold one piece into a square and the other into an equilateral triangle. What is the largest joint area we can enclose? What is the smallest?

- (a) What is your objective function? Do you need one objective function, or two?
- (b) What constraint are you operating under?
- (c) Make a single-variable function and find the critical points.
- (d) Answer the questions. How do we know when we have a maximum or minimum?