

Midterm 1 Study Guide and Info

This midterm covers material from Chapter 1 only. Topics from the Review assignment are not specifically covered.

Calculators will be allowed, but not required. I will make the numbers reasonable to do by hand.

One 4x6 notecard is allowed, and you can use both sides. You can write whatever you want as long as you write it yourself.

The test will be during our regular class time on Friday, September 27.

You should be prepared to:

- Solve linear equations in one variable, including rational equations that become linear like (1.1, #43-53).
- Write an inequality for a story problem as in 1.2. Solve it and graph the solutions on a real number line.
- Write the equation of a line given two points. Change it from point-slope form to slope-intercept form (see 1.3).
- Sketch the graph of a line (see 1.3).
- Solve a system of two linear equations in two variables (using any method you like) (see 1.4).
- Describe the possible types of solutions for a system of two linear equations in two variables (see page 31 of text book).
- Given a formula for a function, evaluate the function at real numbers or at expressions containing variables, as in (1.5, #41-52).
- Find the total cost function, profit function, marginal cost, marginal profit and break even point for a given situation, as in 1.6.
- Answer questions about a supply-demand problem, like in (1.6, #4).
- Given a story problem, write the objective function and the constraints (inequalities) for the feasible region (see 1.8).
- Use graphical linear programming to find a maximum or minimum value, including graphing the feasible region and finding and checking all corners (see 1.8).

Example Problems

This is NOT a complete list of examples, since the problems types will be very similar to the homework. But just so there is no surprises, here are a few questions so you can get used to the way I might like to word them.

1. A small clothing factory has 1 cutting machine and 2 sewing machines and is open for 10 hours a day. Hence there are 10 cutting hours and 20 sewing hours available per day. Shirts take 2 minutes of cutting and 3 minutes of sewing, while pants take 1 minute of cutting and 2.5 minutes of sewing. The company makes a profit of \$2 per shirt and \$1.50 for pants. Let s be the number of shirts made per day and p the number of pants.
 - a. Write the objective function for this situation (the profit per day).
 - b. Write the constraints that define the feasible region (you should write 4 inequalities involving s and p).
2. Billy spent \$20 building a lemonade stand. Supplies to make a cup of lemonade cost \$0.10, and he sells them for \$0.50. Let x be the number of cups of lemonade he sells.
 - a. Write the total cost function.
 - b. Write the profit function.
 - c. What is the marginal cost?
 - d. What is the marginal profit?
 - e. How many cups must he sell in order to break even?
3. There are two investment accounts, account A which pays 9% annually and account B which pays 7% annually. Susan has \$1000 to invest, and wants to earn at least \$80 a year. Let x be the amount she invests in account A. Write and solve an inequality that is true exactly when she achieves her goal.
4. (Multiple choice) If a system of linear equations has no solutions, we know that
 - a. The lines are perpendicular.
 - b. The lines are parallel.
 - c. The two lines are actually the same line.
 - d. The lines are horizontal.
 - e. The lines are vertical.
 - f. You cannot conclude any of the above.