Pre-Calculus CP 1 – Section 7.6 Day 2 Notes **Name:** KEY

More Linear Programming Examples

Example: A candy manufacturer wants to maximize the profit for two types of boxed chocolates. A box of chocolate covered creams yields a profit of \$1.50 per box and a box of chocolate covered nuts yields a profit of \$2.00 per box. Market tests and available resources have indicated the following constraints:

a) The combined production level should not exceed 1200 boxes per month.
b) The demand for a box of chocolate covered nuts is no less than half the demand for a box of chocolate covered creams
c) The production level for chocolate covered ~~creams~~ nuts should be less than or equal to 600 boxes plus three times the production level for chocolate ~~covered~~ ~~nuts~~ creams.

Let x be the number of boxes of chocolate covered creams.
Let y be the number of boxes of chocolate covered nuts.

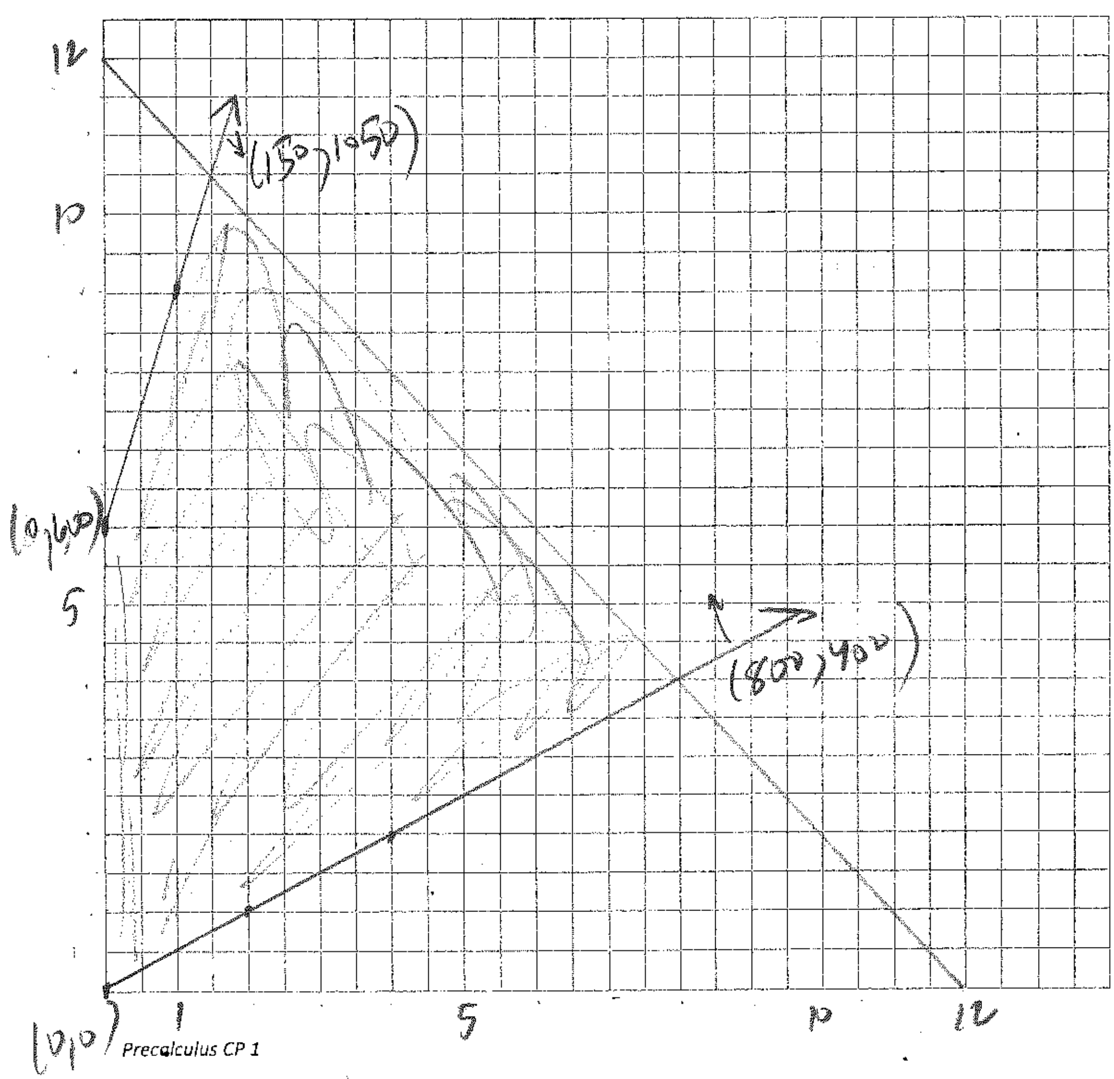
Set up a system of inequalities for this situation, graph it and determine the # of boxes of creams and nuts that would ensure the greatest profit.

$x + y \le 1200$

$y \ge \frac{1}{2}x$

$y \le 600 + 3x$

$P = 1.5x + 2y$



$P = 1.5(150) + 2(1050)$

$\boxed{\$2325}$

Max

Example 2: You have a garden and grow tomatoes and onions. You are going to use them to make jars of tomato sauce and jars of salsa to sell at a farm stand.

- A jar of tomato sauce requires 10 tomatoes and 1 onion.
- A jar of salsa requires 5 tomatoes and ¼ of an onion.

Restrictions:

- Your garden produces up to 180 tomatoes
- Your garden produces up to 15 onions
- The farm stand wants at least three times as many jars of tomato sauce as jars of salsa. (In other words the number of jars of tomato sauce must be at least three times the number of jars of salsa).

You'll make a profit of $2 on every jar of tomato sauce sold and a profit of $1.50 on every jar of salsa sold.

Let x be the number of jars of tomato sauce.
Let y be the number of jars of salsa.

Organizing the information in a chart may help!

	# of tomatoes	# of onions
X	10	1
Y	5	1/4

a) Give all the inequalities that represent the constraints. There are five!

\# Tomatoes $10x + 5y \leq 180$

\# onions $x + \frac{1}{4}y \leq 15$

$x \geq 3y$

$x \geq 0$

$y \geq 0$

b) Identify the objective function.

$P = 2x + 1.5y$

Example 3: An investor has up to $450,000 to invest in two types of investments. Type A pays 6% annually and Type B pays 10% annually. To have a well-balanced portfolio, the investor imposes the following conditions:
At least ½ of the total portfolio is to be allocated to Type A investments and at least ¼ of the total portfolio is to be allocated to Type B investments.

a) Assign Labels x = Type A $ amount

Y = Type B $ amount

b) What is the profit equation P = $.06x + .1y$

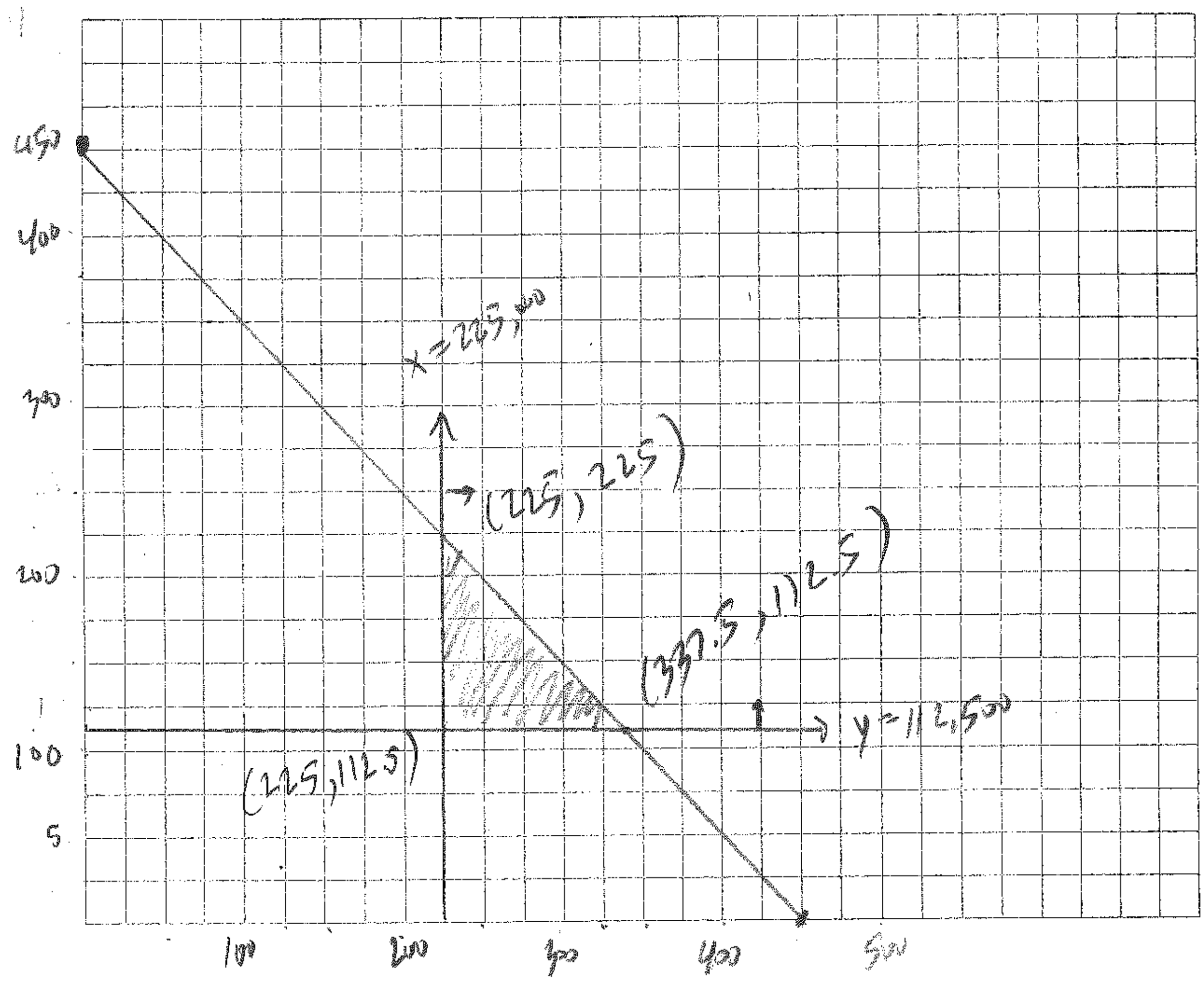
c) List the inequalities implied by the above scenario.

$x + y \leq 450000$

$x \geq 225,000$

$y \geq 112,500$

d) Graph the feasible region and label all of the corner points on the graph.



e) What is the maximum profit?

Profit = \$36,000

f) How much should be invested in each account?

Type A = 225,000

Type B = 225,000

$P(225, 112.5) = .06(225) + .1(112.5) = 24.75$

$P(225, 225) = .06(225) + .1(225) = 36$

$P(337.5, 112.5) = .06(337.5) + .1(112.5) = 31.5$