Intermediate Algebra
Unit 1 Review

Friday
in class

Name Baxter Key
Period___Date_____

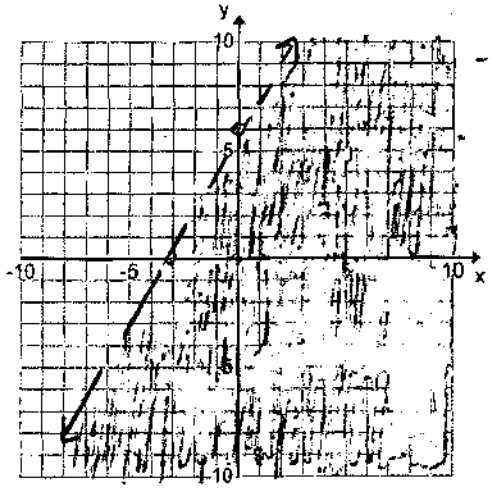
1.1 I can demonstrate understanding of how to represent a region on a graph with an inequality.

Change #8 $y < 2x + 7$

Level 1
Graph each inequality to find the solution region. List one possible solution for each inequality.

1. $-2x + y < 6$

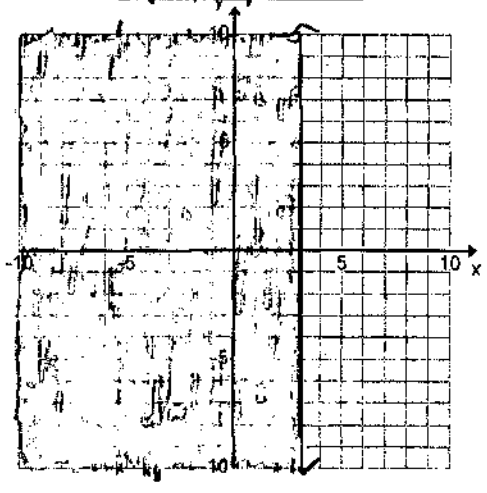
Solution: (0, 0)



$-2(0) + 0 < 6$
$0 < 6$

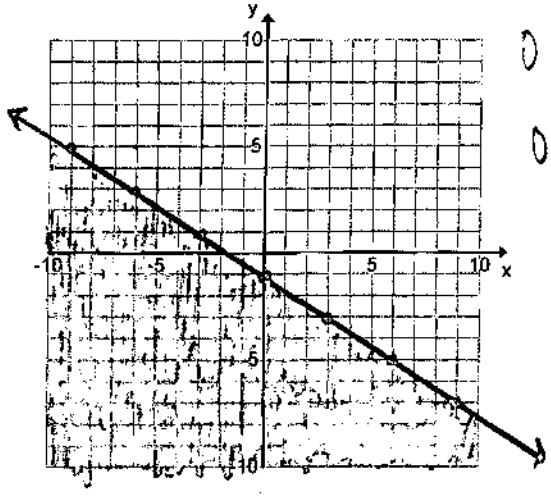
2. $x \leq 3$

Solution: (0, 0)



3. $y \leq -\frac{2}{3}x - 1)$

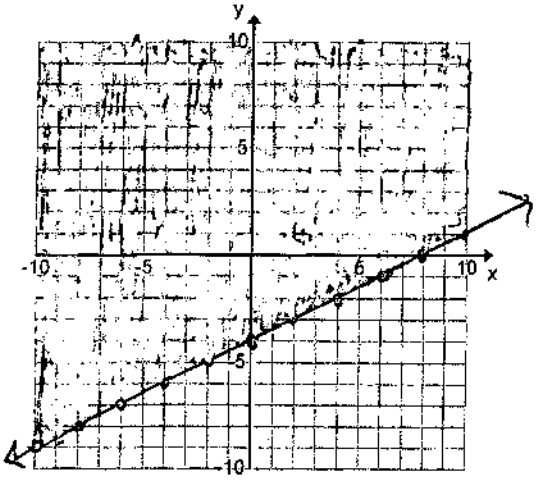
Solution: (0, -5)



$0 \leq -\frac{2}{3}(0) - 1$
$0 \leq -1$ X

4. $y \geq 1/2x - 4$

Solution: (0, 0)



$0 \geq \frac{1}{2}(0) - 4$
$0 \geq -4$

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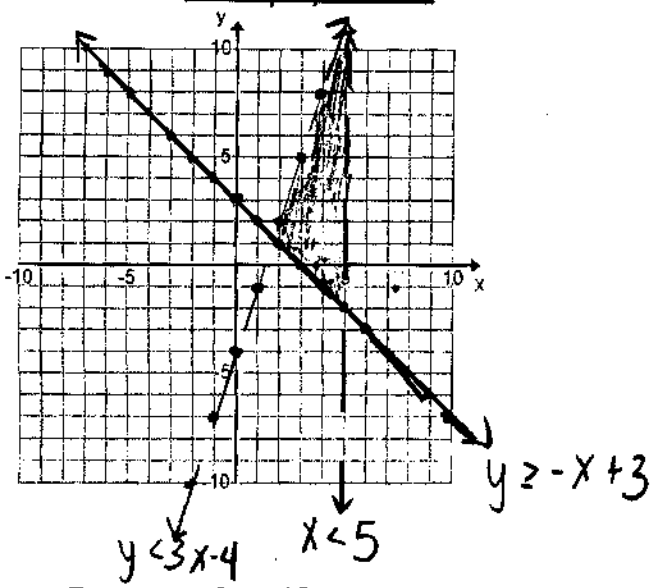
Graph each system of inequalities to find the solution region. List one possible solution for each system.

5.

$y < 3x - 4$
$y \geq -x + 3$
$x < 5$

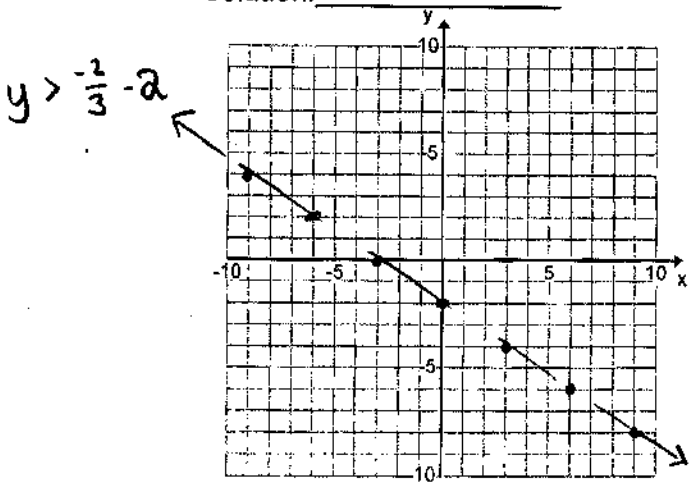
Solution: (4, 1)



6.

$4x - 27 \leq 14$
$y > -\frac{2}{3}x - 2$

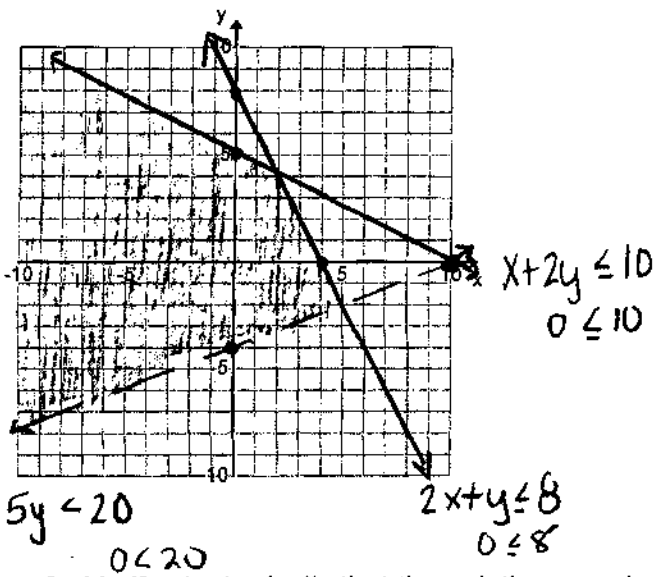
Solution:_____



7.

$x + 2y \leq 10$
$2x + y \leq 8$
$2x - 5y < 20$

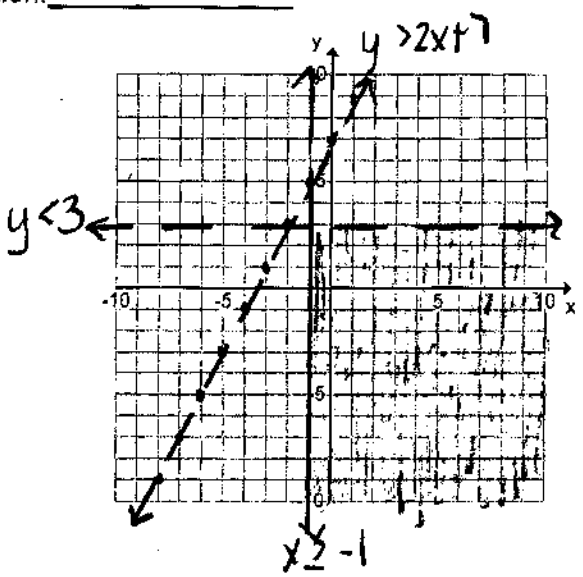
Solution: (0, 0)



8.

$y \leq 2x + 7$
$x \geq -1$
$y < 3$

Solution:_____



9. Verify algebraically that the solution you chose in Problem 8 is correct.

(0,0) $0 < 2(0) + 7$ $0 \geq -1$ ✓

$0 < 7$ ✓ $0 < 3$ ✓

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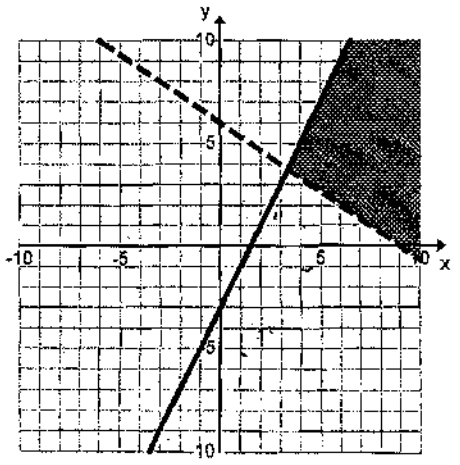
10. Given $-3x - 4y > 10$ determine algebraically if the following points are solution. Explain why or why not.

a. (2, -3) NO
$-3(2) - 4(-3) > 10$
$-6 + 12 > 10$
$6 > 10$

b. (0, 0) NO
$-3(0) - 4(0) > 10$
$0 > 10$ NO

c. (-1, -7) yes
$-3(-1) - 4(-7) > 10$
$3 + 28 > 10$
$31 > 10$

11. Use the graph of the system of inequalities to determine if each point is in the solution region. Explain why or why not for each point.



a. (0, 1) Solution: YES (NO)
Explanation: not in Shaded Region

b. (5, 4) Solution: (YES) NO
Explanation: In Shaded Region

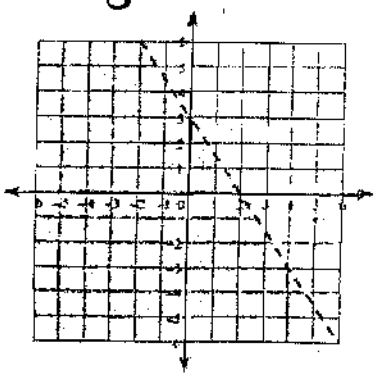
c. (0, -3) Solution: YES (NO)
Explanation: not in Shaded Region

d. (6, 2) Solution: YES (NO)
Explanation: on dashed line

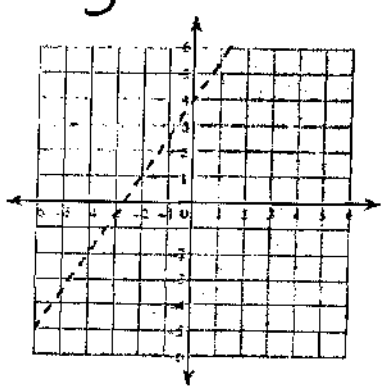
e. (4, 5) Solution: (YES) NO
Explanation: on solid line

Write an inequality for each graph.

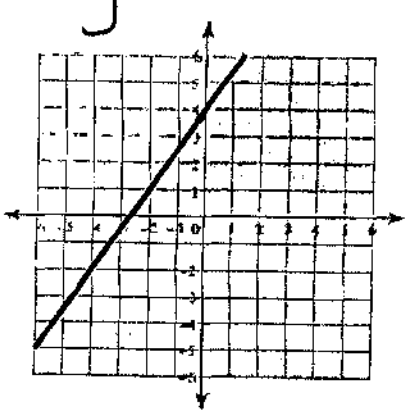
12. a. $y < -\frac{3}{2}x + 3$



b. $y < \frac{3}{2}x + 4$



c. $y \leq \frac{3}{2}x + 4$



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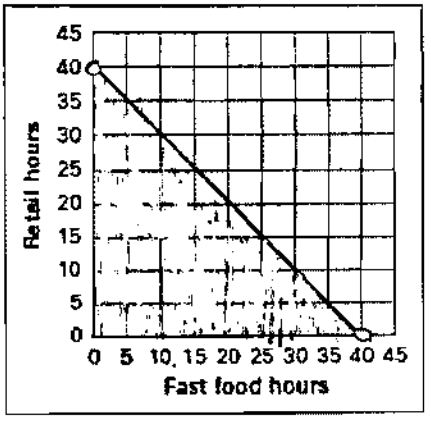
Level 2

13. A person less than 16 years of age can work up to 40 hours per week according to child labor laws. A 15 year old student plans on working two jobs this summer, one at a fast food restaurant and one at a retail store.

a. Write and graph an inequality that represents the possible number of hours the student can work. Let x represent the hours worked at the fast food restaurant and y the hours worked at the retail store.

$x + y \leq 40$



b. What does the point (10, 13) represent in this problem?

10 hours at fast food Restaurant
13 hours at Retail Store

c. Is the point (10, 13) a solution? Why or why not?

yes, in Shaded Region

d. What does the point (25, 16) represent in this problem?

25 hours at fast food Restaurant
16 hours at Retail Store

e. Is the point (25, 16) a solution? Why or why not?

$25 + 16 = 41 \quad 41 \neq 40$

No

14. Admission prices were $12 for adults and $6 for students. The theater needs to make at least $10,000.

a. Write an inequality to represent the amount of money made from ticket sales:

$12x + 6y \geq 10{,}000$

x - # of adult tickets
y - # of student tickets

b. What is the minimum number of adult tickets the theater needs to sell to make at least $10,000 if they have sold 1200 student tickets?

$12x + 6(1200) \geq 10{,}000$

$12x + 7{,}200 \geq 10{,}000$

$-7200 \quad -7{,}200$

$\frac{12x}{12} \geq \frac{2800}{12}$

$x \geq 233.\overline{3}$

Sell at least
234 adult tickets

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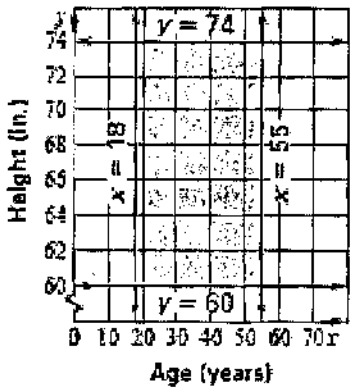
15. To be a flight attendant, you must be at least 18 years old and at most 55 years old, and you must be between 60 and 74 inches tall, inclusive. Let x represent a person's age (in years) and let y represent a person's height (in inches).



Identify two solutions (age, height) and justify your answers:

In shaded Region (many Solutions)

* 30 years old 65 inches tall (30, 65)
* 40 years old 65 inches tall (40, 65)

Level 3

16. Explain the reason for needing dashed and solid lines when graphing linear inqualities.

Solid can equal $\geq \leq$

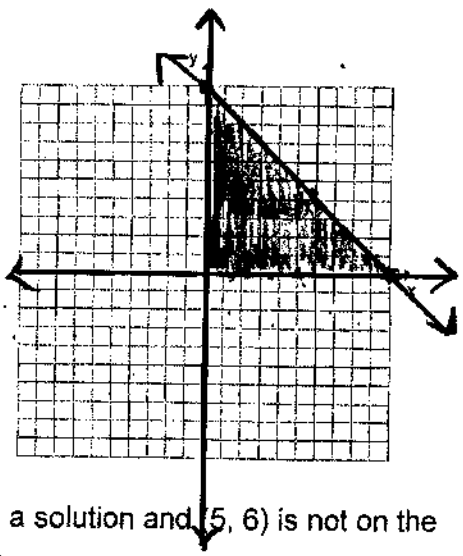
dash can't equal $> <$

17. Write a system of linear inequalities whose graph is the interior of a right triangle. A grid is provided if you find it helpful. many Solutions

$x \geq 0$

$y \geq 0$

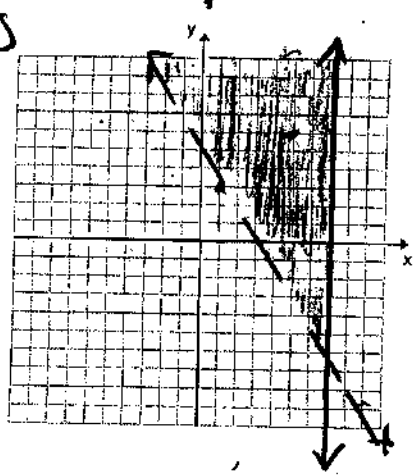
$x + y \leq 10$



18. Write an inequality where (1, 3) is on the boundary line and not a solution and (5, 6) is not on the boundary line and is a solution. many Solutions

$y > -2x + 5$

$x \leq 7$



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1.3 I can use the theory of linear programming to optimize a real world situation.

PLEASE PICK TWO OF THE FOLLOWING THREE PROBLEMS TO PRACTICE. You will pick ONE to complete on test day. **To earn an A, you must complete the LEVEL 3 Problem on the test.

Linear Programming – Level 1 (earns you a C for LT 1.3)

A carpenter makes tables and chairs. Each table can be sold for a profit of $30 and each chair for a profit of $10. The carpenter can afford to spend up to 42 hours per week working and takes three hours to make a chair and six hours to make a table. The carpenter has a small shop and has limited room for storage. He has only 40 cubic feet available for storage. Chairs take 5 cubic feet of storage and the tables are collapsible and only take 4 cubic feet of storage.

a. Identify the variables:

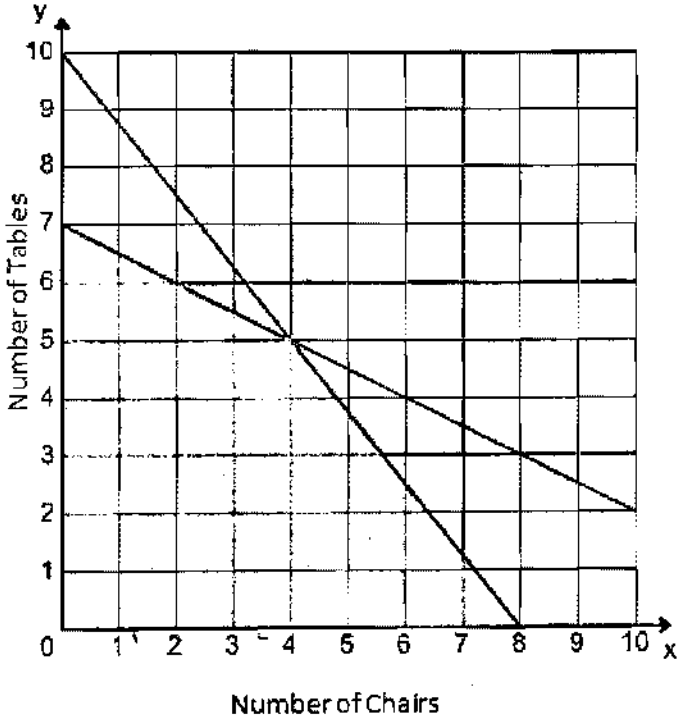
x = # of chairs
y = # of tables

b. Write an objective function for the profit:

$P = 10x + 30y$

c. List the vertices and find the profit

Vertex	Profit	
(0,0)	0	$10(0)+30(0)=0$
(8,0)	80	$10(8)+30(0)=80$
(0,7)	210	$10(0)+30(7)=210$
(4,5)	190	$10(4)+30(5)=190$



Constraints:
Storage: $5x + 4y \leq 40$
Time: $3x + 6y \leq 42$

d. Make a recommendation for the carpenter (how many of each should he make and what is his maximum profit)

0 chairs and 7 tables for maximum profit of $210

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Linear Programming – Level 2 (earns a B on LT 1.3)

Piñatas are made to sell at a craft fair. It takes 2 hours to make a mini piñata and 3 hours to make a regular-sized piñata. The owner of the craft booth will make a profit of $12 for each mini piñata sold and $24 for each regular-sized piñata sold. If the craft booth owner has no more than 30 hours available to make piñatas and wants to have at least 12 piñatas total to sell, how many of each size piñata should be made to maximize profit?

a. Define the variables

x = # of mini piñatas
y = # of Regular Piñatas

b. Write the objective function used to maximize the profit

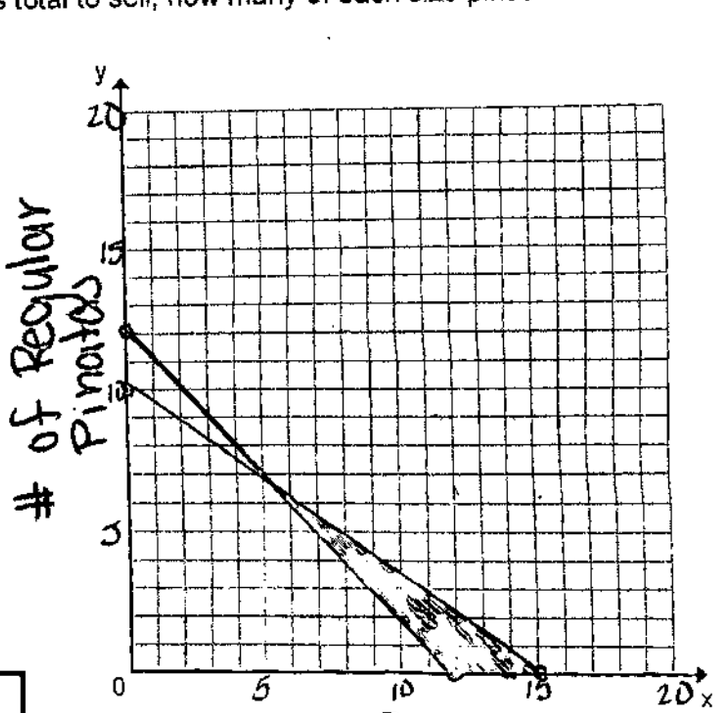
$12x+24y=P$

c. Constraints

Total Number of Piñatas: x-int 12 y-int 12

$x+y\geq 12$

Time: $2x+3y\leq 30$ x-int 15 y-int 10



d. Graph the constraints and shade the feasible region.

e. List the vertices and find the profit for each vertex

Vertex	Profit
(10,0)	120
(15,0)	180
(6,6)	216

$12(10)+24(0)=120$
$12(15)+24(0)=180$
$12(6)+24(6)=216$

f. Make a recommendation (how many of each type should be made and profit)

6 mini piñatas and 6 Regular Piñ

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Linear Programming – Level 3 (earns an A on LT 1.3)

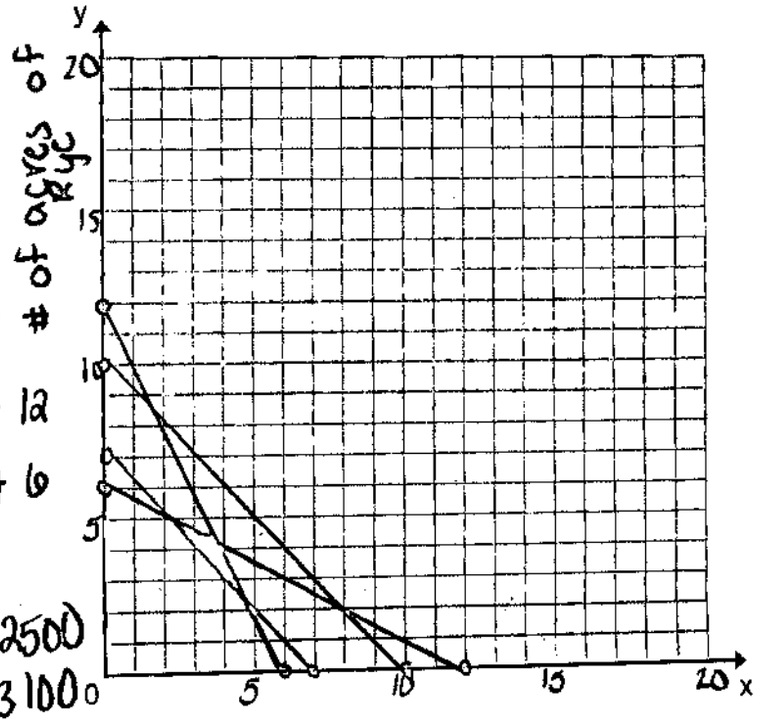
A farmer has 10 acres to plant wheat and rye. He has to plant at least 7 acres total. However, he has only $1200 to spend and each acre of wheat costs $200 to plant and each acre of rye costs $100 to plant. Moreover, the farmer has to get the planting done in 12 hours and it takes an hour to plant an acre of wheat and 2 hours to plant an acre of rye. The profit is $500 per acre of wheat and $300 per acre of rye.

How much of each type of plant should the farmer plant to maximize profit? What is the farmer's maximum profit?

x - # of acres of wheat
y - # of acres of Rye

$P = 500x + 300y$

$x + y \geq 7$ x-int 7 y-int 7
$x + y \leq 10$ x-int 10 y-int 10
$200x + 100y \leq 1200$ x-int 6 y-int 12
$x + 2y \leq 12$ x-int 12 y-int 6



# of acres of wheat

(2,5) $500(2)+300(5)=2500$
(5,2) $500(5)+300(2)=3100$
(4,4) $500(4)+300(4)=3200$

4 acres of wheat and 4 acres of Rye for maximum profit of $3,200