Module 4 Lesson 4 Notes GRAPHING SYSTEMS OF INEQUALITIES

Remember that: $<$ or $>$ means you will use a dashed line.

$\leq$ or $\geq$ means you will use a solid line.

The solutions to a system of inequalities occurs anywhere that the shading for the two lines overlaps.

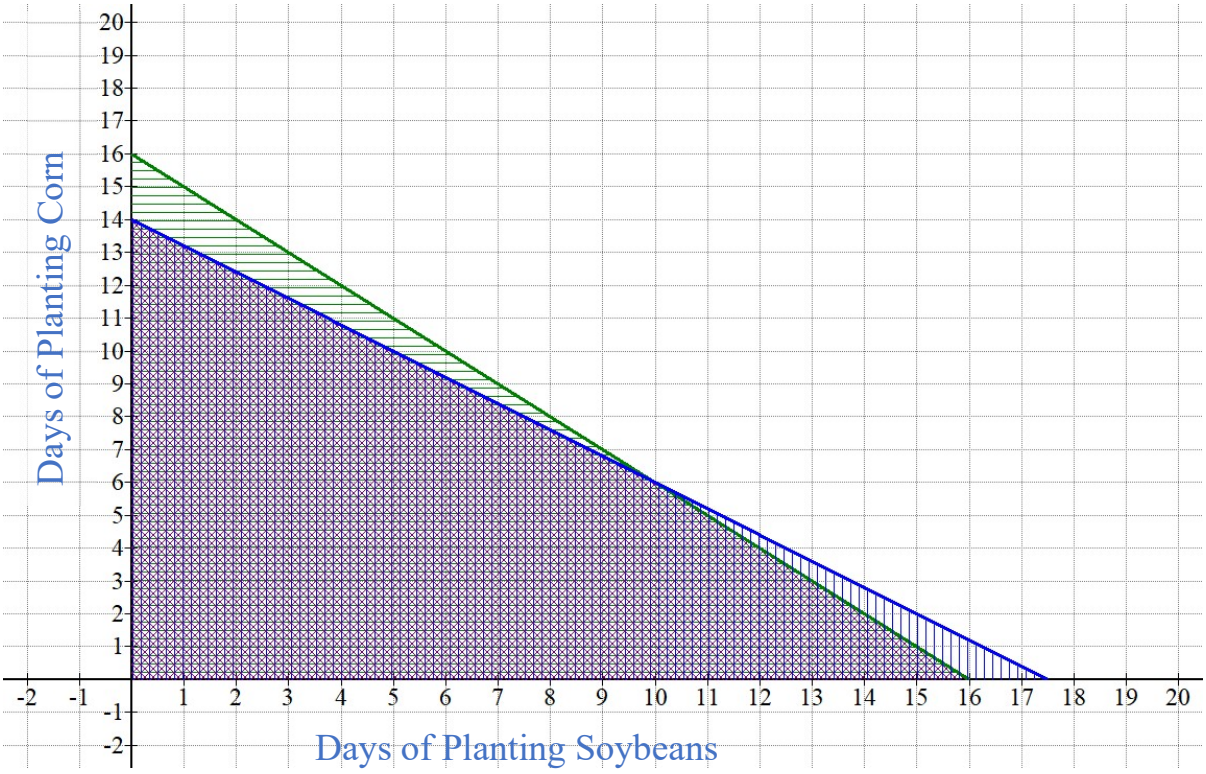
Write and Solve a System of Inequalities

To ensure a growing season of sufficient length, Mr. Hobson has at most 16 days left to plant his corn and soybean crops. He can plant corn at a rate of 250 acres per day and soybeans at a rate of 200 acres per day. If he has at most 3500 acres available, how many acres of each type of crop can he plant?

Let C represent the days of planting corn, and let S represent the days of planting soybeans. We also need to decide which variable we will represent on the y-axis. I will choose C (days of planting corn). So, I will need to solve all equations for C.

$$250C + 200S \leq 3500$$
$$-200S \quad -200S$$
$$250C \leq -200S + 3500$$
$$\frac{250C}{250} \leq \frac{-200S}{250} + \frac{3500}{250}$$
$$C \leq -\frac{4}{5}S + 14$$

$$C + S \leq 16$$
$$-S \quad -S$$
$$C \leq -S + 16$$
$$C \leq -\frac{1}{1}S + 16$$



Any set of values within the purple shaded region would be a possible solution. The optimal solution would be at the intersection of the two lines.

Module 4 Lesson 4 Notes GRAPHING SYSTEMS OF INEQUALITIES

The most Jack can spend on bagels and muffins for the cross country team is $28. A package of 6 bagels costs $2.50. A package of muffins costs $3.50 and contains 8 muffins. He needs to buy at least 12 bagels and 24 muffins.

a) Graph the region that shows how many packages of each item he can purchase.

Let b represent the number of packages of bagels purchased, and let m represent the number of packages of muffins purchased. We also need to decide which variable we will represent on the y-axis. I will choose m (packages of muffins). So, I will need to solve all equations for m.

$2.50b + 3.50m \leq 28$

$-2.50b \qquad -2.50b$

$3.50m \leq -2.50b + 28$

$\frac{3.50m}{3.50} \leq \frac{-2.50b}{3.50} + \frac{28}{3.50}$

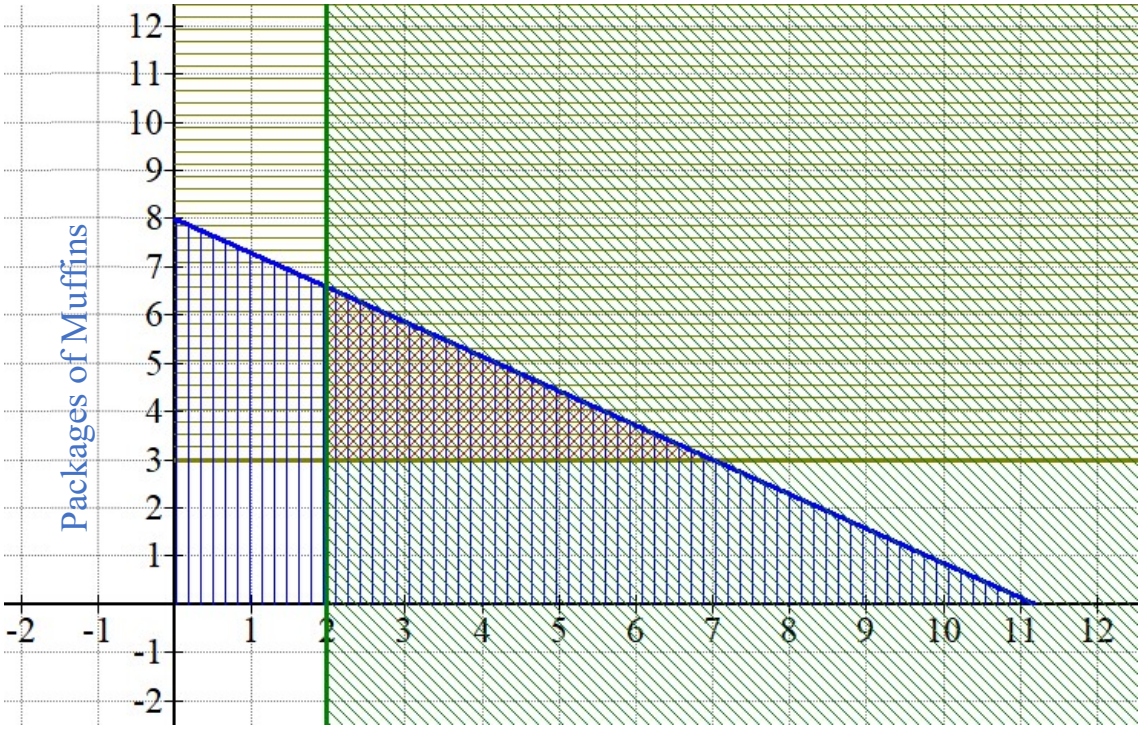
$m \leq -\frac{5}{7}b + 8$

$\frac{12}{6} = 2$

$b \geq 2$

$\frac{24}{8} = 3$

$m \geq 3$



b) Give an example of three different purchases he can make.

Jack could purchase any amount of packages from within the shaded red triangle. I will choose 3.

He could purchase 3 packages of bagels and 4 packages of muffins.

He could purchase 5 packages of bagels and 4 packages of muffins.

He could purchase 3 packages of bagels and 5 packages of muffins.

Module 4 Lesson 4 Notes GRAPHING SYSTEMS OF INEQUALITIES

Solve each system of inequalities by graphing.

1) $x \leq 4$
$y > 2$

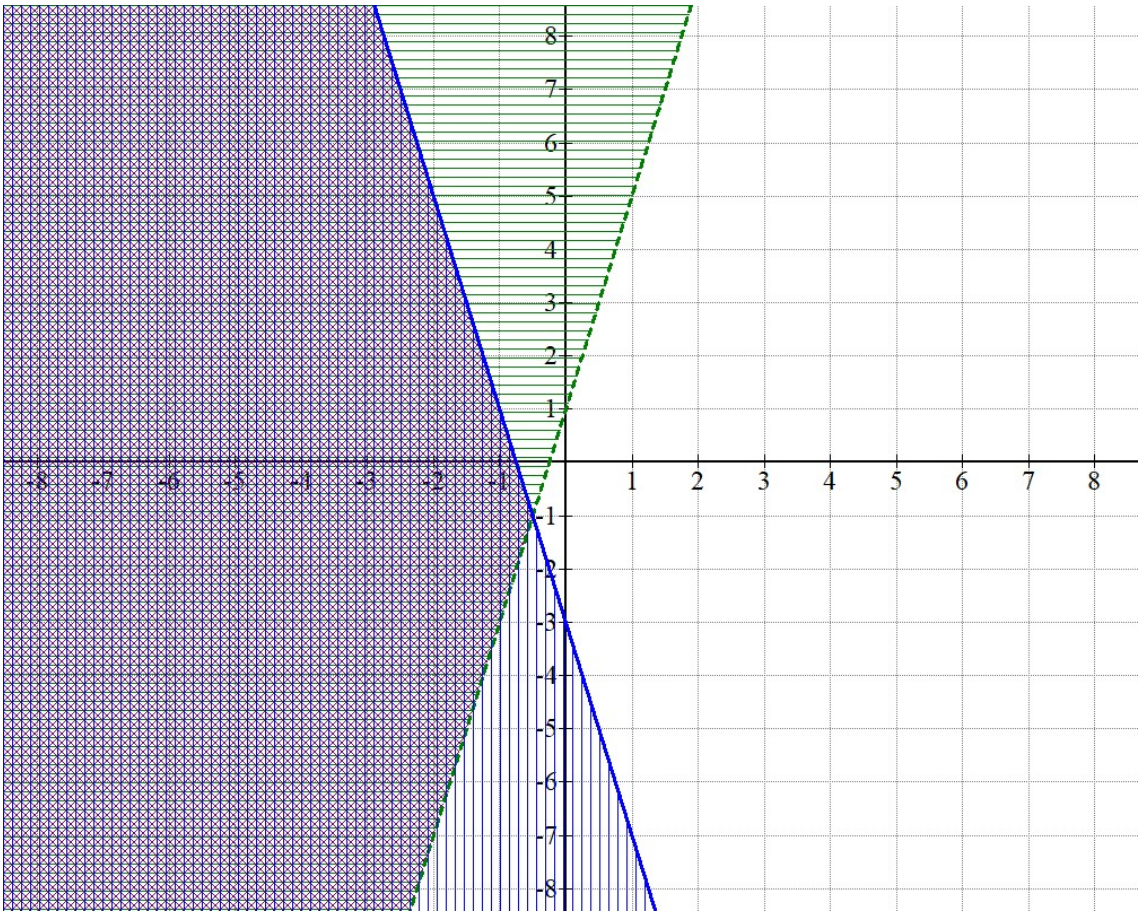
The area shaded purple is the solution to the system of inequalities.

2) $y \leq -4x - 3$
$y > 4x + 1$

$y \leq -\frac{4}{1}x - 3$

$y > \frac{4}{1}x + 1$

The area shaded purple is the solution to the system of inequalities.



3) $y > 3$
$y > -x + 4$

$y > 3$

$y \leq -\frac{1}{1}x + 4$

The area shaded purple is the solution to the system of inequalities.

4) $2x + y \geq 4$
$y \leq -2x - 1$

$2x + y \geq 4$
$-2x \quad -2x$
$y \geq -2x + 4$
$y \geq \frac{-2}{1}x + 4$

$y \leq -\frac{2}{1}x - 1$

Since the shading never overlaps, there is NO SOLUTION to the system of inequalities