...cost to run Machine 1 for an hour is $2. During that hour, Machine 1 produces 240 bolts and ... nuts. The cost to run Machine 2 for an hour is $2.40. During that hour, Machine 2 produces ... bolts and 160 nuts. With a combined running time of no more that 30 hours, how long should each machine run to produce an order of at least 2080 bolts and 1520 nuts at the minimum operating cost?

$-\frac{5}{8}x + 9.5 = -\frac{3}{2}x + 13$

$= 3.5$

$-\frac{5}{8}x + \frac{3}{2}x$

$-\frac{5}{8}x + \frac{12}{8}x = \frac{7}{8}$

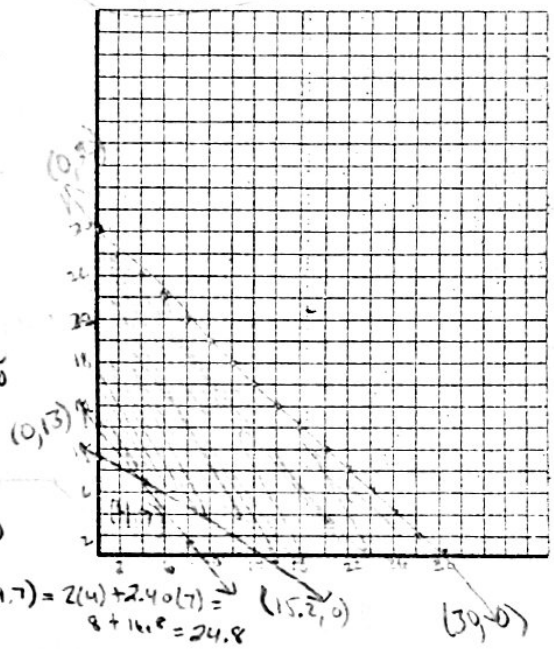
$\frac{7}{8}x = 3.5$

$x = 4$

$y = 7$

	Machine 1 (x)	Machine 2 (y)	Constraint
bolts	240	160	≥ 2080
nuts	100	160	≥ 1520
Time	1x	1y	≤ 30

4 hrs Machine 1
7 hrs Machine 2



$C = 2x + 2.40y$

$100x + 160y \geq 1520$

$-100x \quad -100x$

$160y \geq -100x + 1520$

$\frac{160y}{160} \geq \frac{-100x + 1520}{160}$

$y \geq -\frac{5}{8}x + 9.5$

$0 \geq -\frac{5}{8}x + 9.5$

$-9.5 = -\frac{5}{8}x$

$-\frac{19}{2} \cdot -\frac{8}{5} = \frac{152}{10}$

$240x + 160y \geq 2080$

$-240x \quad -240x$

$160y \geq -240x + 2080$

$\frac{160y}{160} \geq \frac{-240x + 2080}{160}$

$y \geq -\frac{3}{2}x + 13$

$x + y \leq 30$

$y \leq -x + 30$

$C = 2x + 2.40y$

$(0,13) = 2(0) + 2.40(13) = 31.2$

$(0,30) = 2(0) + 2.40(30) = 72$

$(30,0) = 2(30) + 2.40(0) = 60$

$(4,7) = 2(4) + 2.40(7) =$

$8 + 16.8 = 24.8$

6. A company makes whole-wheat crackers and sesame crackers. The crackers are sold by the box. Each box of wheat crackers contains 5 packets and each box of sesame crackers contains 3 packets. The company cannot produce more than 150 packets of crackers per minute, but at least 15 boxes of whole-wheat crackers and at least 20 boxes of sesame crackers must be produced per minute. If the profit per box of whole-wheat crackers is 10 cents and the profit per box of sesame crackers is 5 cents, how many boxes of each type should be produced per minute in order to maximize profits? What is the maximum profit?

	whole wheat (x)	sesame (y)	Constraint
packets	5	3	150
	x		≥ 15
		y	≥ 20

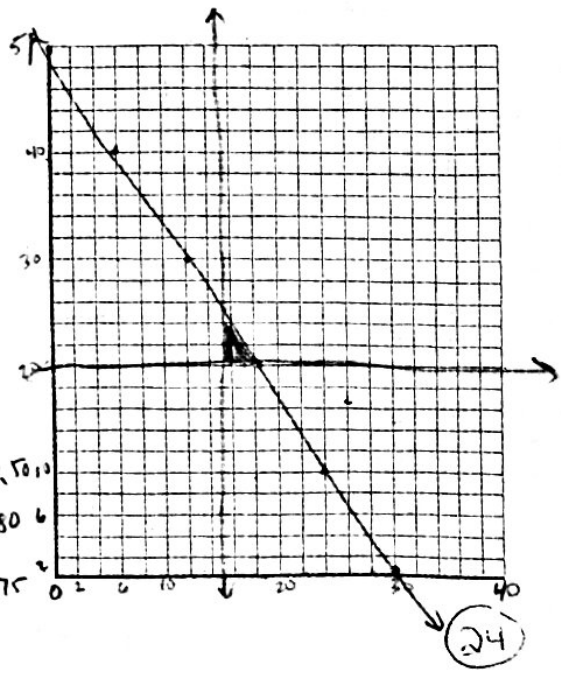
$P = .10x + .05y$

$5x + 3y \leq 150 \quad x \geq 15 \quad y \geq 20$

$3y \leq -5x + 150$

$y \leq -\frac{5}{3}x + 50$

18 boxes whole wheat
20 boxes sesame
most profit of $2.80



$(15,20) = .10(15) + .05(20) = 2.50$

$*(18,20) = .10(18) + .05(20) = 2.80$

$(15,25) = .10(15) + .05(25) = 1.75$

7. A biologist wishes to feed laboratory rabbits a mixture of two types of foods. Type I contains 8g of fat, 12 g of carbohydrates, and 2 g of protein per ounce, whereas type II contains 12g of fat, 12 g of carbohydrates, and 1 g of protein per ounce. Type I costs $.20 per ounce and type II costs $.30 per ounce. The rabbits each receive a daily minimum of 24g of fat, 36g of carbohydrates, and 4 g of protein per ounce, but get no more than 5 oz of food per day. How many ounces of each food type should be fed to each rabbit daily to satisfy the dietary requirements at minimum costs?

	Type I (x)	Type II (y)	Constraints
fat	8	12	≥ 24
carbs	12	12	≥ 36
protein	2	1	≥ 4
total	1	1	≤ 5

$C = .20x + .30y$

$8x + 12y \geq 24$

$12y \geq -8x + 24$

$y \geq -\frac{2}{3}x + 2$

$12x + 12y \geq 36$

$12y \geq -12x + 36$

$y \geq -x + 3$

$2x + 1y \geq 4$

$y \geq -2x + 4$

$x + y \leq 5$

$y \leq -x + 5$

$(0,5) = .30(5) = 1.50$

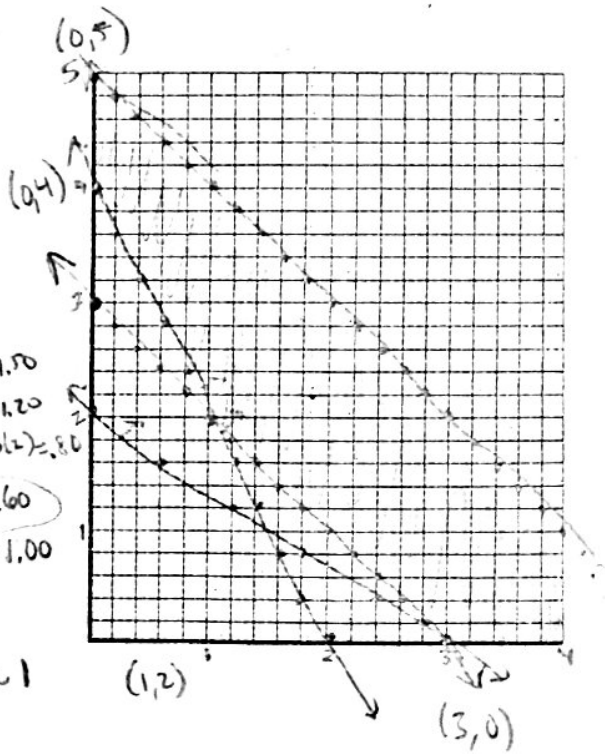
$(0,4) = .30(4) = 1.20$

$(1,2) = .20(1) + .30(2) = .80$

$(3,0) = .20(3) = .60$

$(5,0) = .20(5) = 1.00$

3oz Type I



8. *Denim Duds* makes jackets and jeans. Each garment must be cut from a pattern and sewn. There are 40 worker-hours per day available for cutting and 52 workers-hours available for sewing. Jackets require 1 hour for cutting and 4 hours for sewing. Jeans take 2 hours to cut and 2 hours to sew. *Demin Duds* makes $14 on each jacket they sell and an $8 profit on each pair of jeans. How many of each garment should be made by the company to make the most profit?

	Jackets (x)	Jeans (y)	
cutting	1	2	≤ 40
sewing	4	2	≤ 52

$P = 14x + 8y$

$4x + 2y \leq 52$

$2y \leq -4x + 52$

$y \leq -2x + 26$

$1x + 2y \leq 40$

$2y \leq -x + 40$

$y \leq -\frac{1}{2}x + 20$

$(0,0) = 0$

$(0,20) = 8(20) = 160$

$(4,18) = 14(4) + 8(18) = 200$

$(13,0) = 14(13) = 182$

4 Jackets
18 Jeans