3.4 Linear Programming

Linear Programming--A technique that identifies the minimum or maximum values of some quantity.

Objective Function--A model of the quantity that you want to make as large or as small as possible.

Constraints--Limits on variables

Feasible Region--Contains all the points that satisfy all the constraints

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Vertex Principle of Linear Programming: If there is a maximum or a minimum value of the linear objective function. it occurs at one or more vertex of the feasible region.

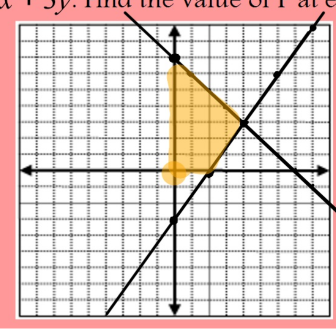
Find the values of x and y that maximize and minimize P for the objective function $P = 2x + 3y$. Find the value of P at each vertex.

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

$y \leq -x + 7$

$x \geq 0$

$y \geq 0$



(0,7) $P = 2(0) + 3(7)$

$0 + 21 = 21$

(4, 3) $P = 2(4) + 3(3)$

$8 + 9 = 17$

(2, 0) $P = 2(2) + 3(0)$

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(0, 0) $P = 2(0) + 3(0) = 0$

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Suppose you are selling cases of mixed nuts and roasted peanuts. You can order no more than a total of 500 cans and packages and spend no more than \$600. How can you maximize your profit? How much is the maximum profit?

Mixed nuts: 12 cans per case and you pay \$24 per case they cost \$3.50 per can.

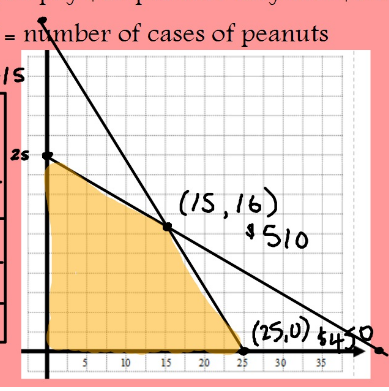
Roasted peanuts: 20 packages per case and you pay \$15 per case they cost \$1.50/pkg.

Let x = number of cases of mixed nuts and y = number of cases of peanuts

$12 \cdot 3.50 = 42 - 24 = 18$ $20 \cdot 1.50 = 30 - 15 = 15$

	Mixed Nuts	Roasted peanuts	Total
# of cases	x	y	$x+y$
# of units	$12x$	$20y$	≤ 500
Cost	$24x$	$15y$	≤ 600
Profit	$18x$	$15y$	$18x+15y$

$-\frac{12x}{20} + \frac{500}{20}$ $-\frac{24x}{15} + \frac{600}{15}$



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