Warm-up: SAT Workbook: 3.3: 2, 6
3.4: 1, 3, 7

Find the *x*- and *y*-intercepts of the graph of each equation.

2. $x - 3y = -15$

4. $3x + 5y = 12$

Use the linear equation to write *y* as a function of *x*.

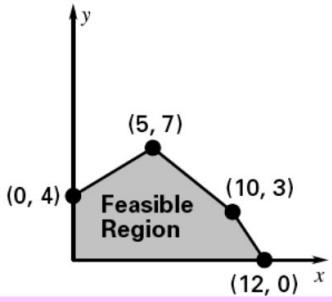
The feasible region of a certain linear programming problem is shown. Which ordered pair of the feasible region maximizes the objective function $M = 5x + 3y$?

A. (0, 4)

B. (5, 7)

C. (10, 3)

D. (12, 0)



2. ***Multiple Choice*** Which ordered pair is *not* a solution of the following system of linear inequalities?

$$y \leq -x + 4$$

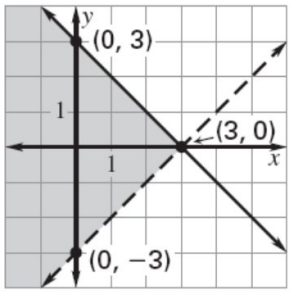
$$y \geq \frac{1}{2}x - 2$$

A (0, 2) **B** (1, 3)

C (−2, 2) **D** (3, 2)

E (−1, −1)

6. ***Multiple Choice*** Which system of linear inequalities is shown in the graph?



(A) $y < -x + 3$
$y \geq x - 3$

(B) $y > -x + 3$
$y < x - 3$

(C) $y \leq -x + 3$
$y > x - 3$

(D) $y \leq -x + 3$
$y \geq x - 3$

(E) $y < -x + 3$
$y > x - 3$

1. ***Multiple Choice*** What is the maximum value of the objective function $C = 2x + 3y$ subject to the following constraints?

$x \geq 0$

$y \geq 0$

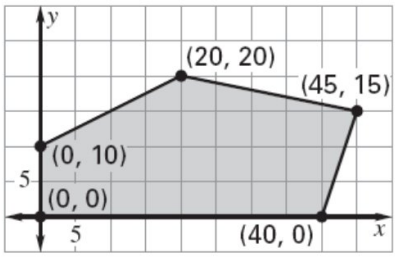
$y \leq -2x + 6$

(A) 0 (B) 3

(C) 6 (D) 18

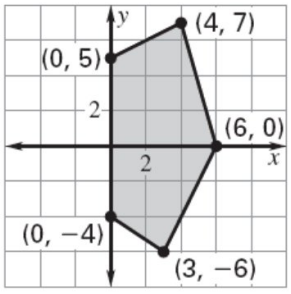
(E) 24

3. ***Multiple Choice*** Given the feasible region shown, which is the maximum value of the objective function $C = 6x + y$?



(A) 0
(B) 10
(C) 140
(D) 240
(E) 285

7. ***Multiple Choice*** Given the feasible region shown, which is the minimum value of the objective function $C = 4x - 3y$?

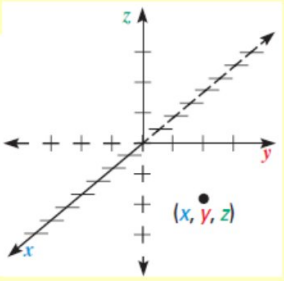


(A) −15
(B) −5
(C) 0
(D) 12
(E) 30

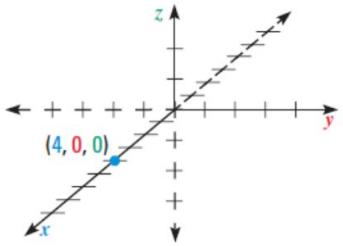
3.5 Graphing Linear Equations in Three Variables
Solve Systems of Linear Equations in Three Variables

A *linear equation in three variables* has the form $ax + by + cz = d$. You can graph this type of equation in a three-dimensional coordinate system formed by three axes that divide space into eight *octants*. Each point in space is represented by an *ordered triple* (x, y, z).

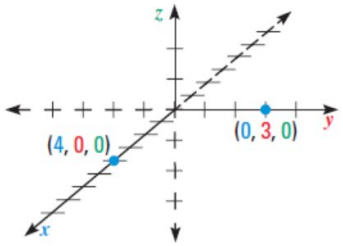
The graph of any equation in three variables is the set of all points (x, y, z) whose coordinates make the equation true. For a linear equation in three variables, the graph is a plane.



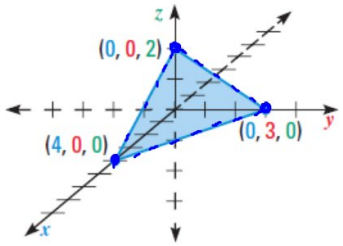
STEP 1 **Find x-intercept**
Find the x-intercept by setting y and z equal to 0 and solving the resulting equation, $3x = 12$. The x-intercept is 4, so plot $(4, 0, 0)$.



STEP 2 **Find y-intercept**
Find the y-intercept by setting x and z equal to 0 and solving the resulting equation, $4y = 12$. The y-intercept is 3, so plot $(0, 3, 0)$.



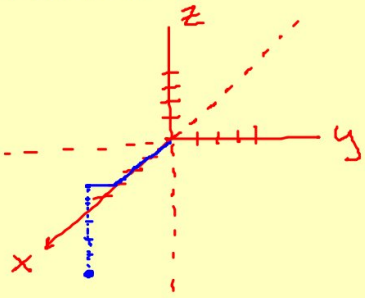
STEP 3 **Find z-intercept**
Find the z-intercept by setting x and y equal to 0 and solving the resulting equation, $6z = 12$. The z-intercept is 2, so plot $(0, 0, 2)$. Then connect the points.

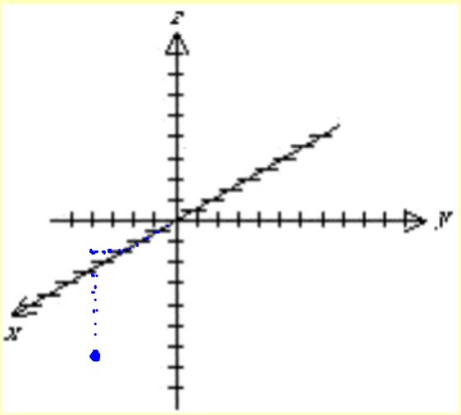


The triangular region shown in Step 3 is the portion of the graph of $3x + 4y + 6z = 12$ that lies in the first octant, where $x \geq 0$, $y \geq 0$, and $z \geq 0$.

3.5 Graphing Linear Equations in Three Variables
Solve Systems of Linear Equations in Three Variables

Graph the point (3, -1, -5)

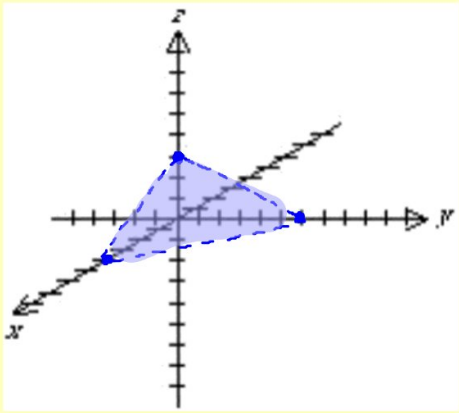




Graph the plane 3x + 2y + 4z = 12

x int let y=0, z=0
(4,0,0)

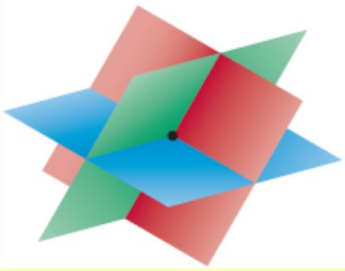
y int (0,6,0)
z int (0,0,3)



A **solution** of such a system is an **ordered triple** (x, y, z) whose coordinates make each equation true.

Exactly one solution

The planes intersect in a single point.



Infinitely many solutions

The planes intersect in a line or are the same plane.

No solution

The planes have no common point of intersection.

Linear Combinations:

Solve: $x + 3y - z = -11$

$2x + y + z = 1$

$5x - 2y + 3z = 21$

$3x + 9y - 3z = -33$

$3x + 4y = -10$ $\xrightarrow{-8}$ $-24x - 32y = 80$

$8x + 7y = -12$ $\xrightarrow{\div 3}$ $24x + 21y = -36$

$-11y = 44$

$y = -4$

$3x + 4(-4) = -10$

$3x = 6$

$x = 2$

$2 + 3(-4) - z = -11$

$-10 - z = -11$

$1 = z$

$(2, -4, 1)$

Homework: 3.5 pg 193: 3, 5
pg 198: 9, 11, 19, 27