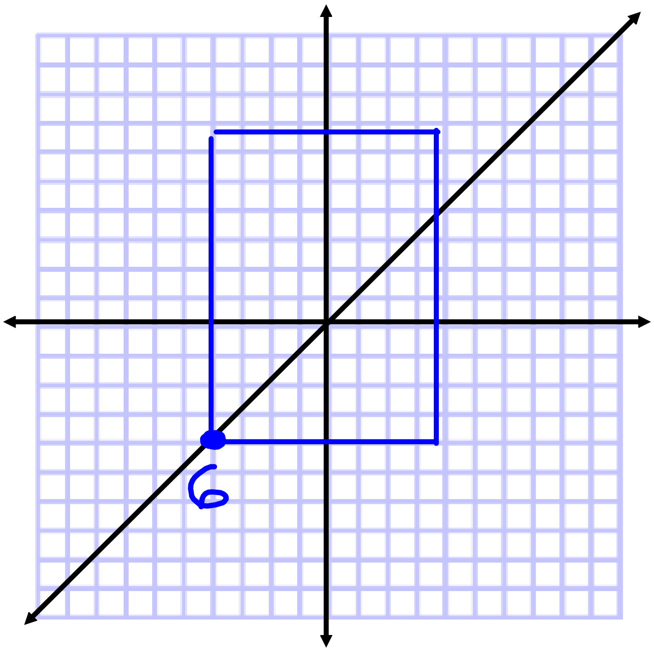
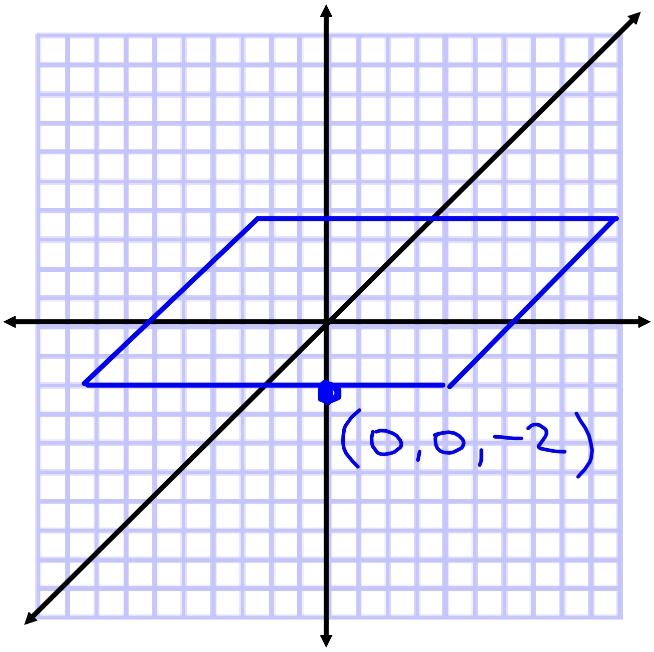
8.6 Sketching Planes in R^3



Planes who Cartesian Equations have one variable. $D \neq 0$

Sketch the plane x = 6

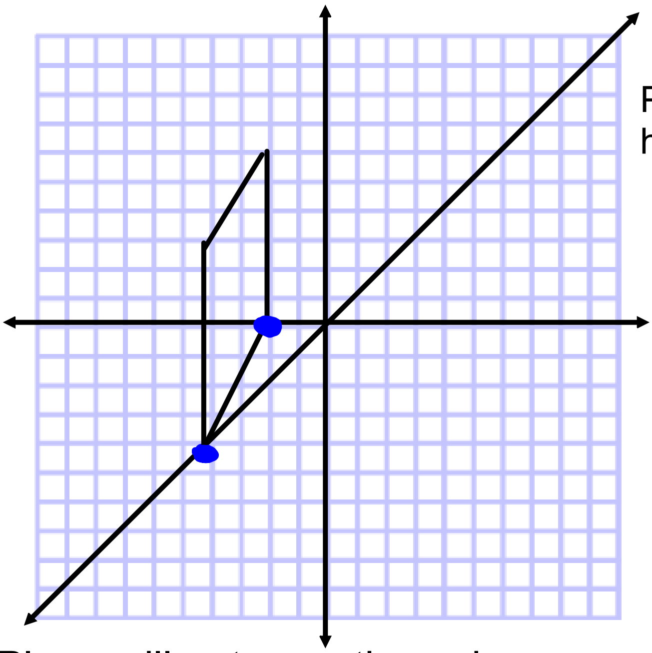
- Since y and z variables are missing, this plane is parallel to the yz-plane.
- draw lines ∥ to the axes.



Sketch the plane z = -2

-crosses z-axis at $z = -2$

-parallel to the xy-plane since x and y variables are missing.



Planes whose Cartesian Equations have two variables $D \neq 0$

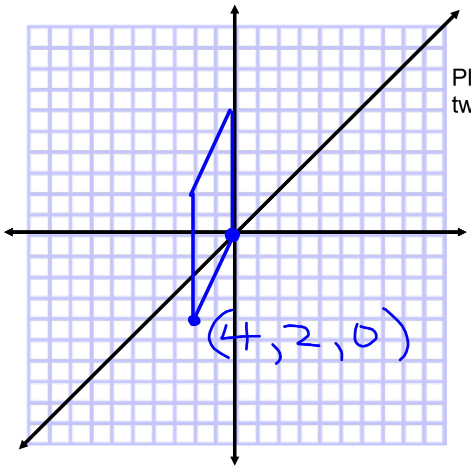
Graph the plane
$2x - 5y - 10 = 0$

Plane will not pass through the origin, since $D \neq 0$

x-int.
$2x = 10$
$x = 5$
$(5,0,0)$ is on the plane

y-int:
$-5y = 10$
$y = -2$
$(0,-2,0)$ is on the plane

- Since z variable is missing, the plane is parallel to the z-axis.



Planes whose Cartesian Equations have two variables

$D = 0$

x - 2y = 0

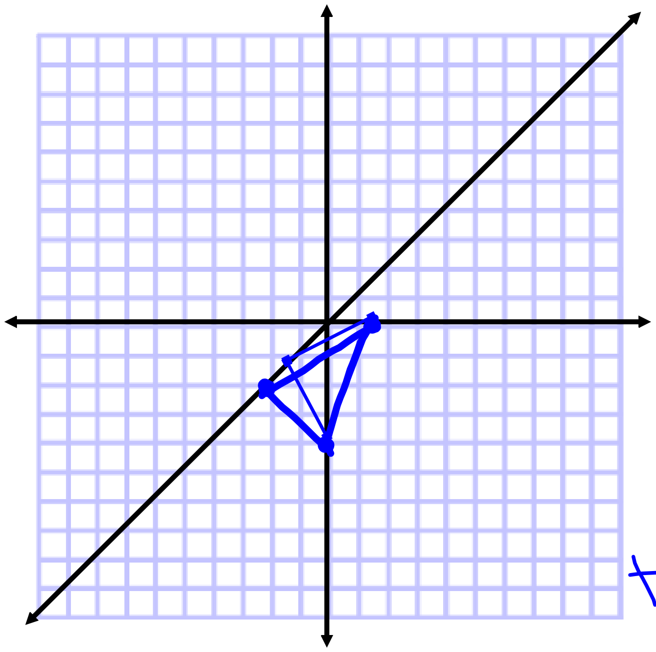
- contains the origin because $D = 0$.
- z is missing $\therefore$ the plane is parallel to the z-axis
- can be written as
  $x - 2y + 0z = 0$
  $\therefore (0, 0, t)$ is a point on the plane. But $t \in \mathbb{R}$
- So this plane contains the z-axis.

- need two points
  If $x - 2y = 0$
  $x = 2y$

when $y = 1$, $x = 2$
$\therefore (2, 1, 0)$ is on the plane

or when $y = 2$
$x = 4$
$\therefore (4, 2, 0)$ is on the plane

May 22-8:58 AM



Planes with Cartesian Equations that have three variables;

$$D \neq 0$$

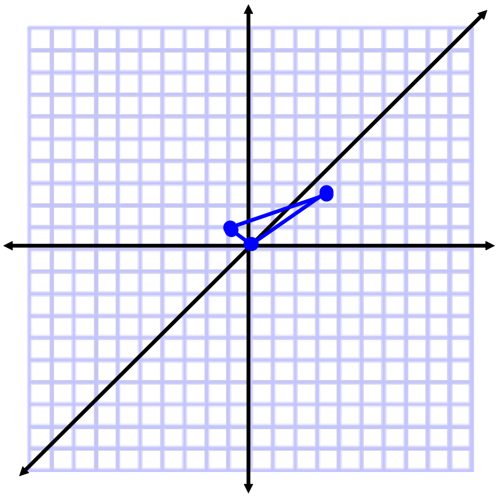
Sketch the plane defined by 2x + 3y - z = 4

Does not pass through origin

- Find all the intercepts
  x-int: 2 (2,0,0)
  y-int: 4/3 (0, 4/3, 0)
  z-int: -4 (0,0,-4)
- Draw a triangle that connects these points

May 20-11:22 AM

Planes whose Cartesian Equations have three variables; $D=0$



Sketch the plane defined by

$x+3y-z=0$

The plane passes through the origin.
Need to find to more points.

- passes through the origin
- find two other points

$\therefore$ Let $y=0$

$x-z=0$

$x=z$

when $x=1$, $z=1$

$\therefore (1,0,1)$

Let $z=0$

$\therefore x=-3y$

when $y=1$, $x=-3$

$\therefore (-3,1,0)$

- Draw a triangle through these points

p
c
f