1.2 Linear Inequalities in One variable

Linear Inequality

Can be written in the form $ax+b \leq c$.

To solve a linear inequality, we do the same steps as we do to solve a linear eqn. The only difference is we need to switch the sign when we multiply or divide by a negative number.

Ex 1 $\frac{3}{2}x + 3 \geq -6$

Solve + graph soln.

Ex 2 $\frac{5x+3}{8} - 1 > \frac{x+4}{6} + 1$

Solve + graph soln.

1.2 (cont)

Ex 3 Translate to an inequality.

Three times a number is less than 13 and greater than -3.

Ex 4 An investor wants to invest a total of $10,000 in 2 different accounts. The riskier investment yields an annual average of 9.5% profit and the safer investment has an annual yield (average) of 4.5%. How much money should be invested in each acct in order to earn at least $600 profit in a year?

1.2 (cont)

Ex 5 A product sells for $20 and has a unit cost of $15, and fixed costs of $200,500. Find the least number of products that must be sold to have a profit.

1.3 Equations of Lines

Linear Eqn in Two variables

can be written as

$y = mx + b$

where $m, b \in \mathbb{R}$

(y = output variable
x = input variable)

Slope (of a line)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$$

$m = 0$ for horizontal line

m is undefined for vertical line

Parallel lines

have same slope

Perpendicular lines

have slopes that multiply to -1

$m_\perp = \frac{-1}{m}$

Eqns of Line

① Slope-Intercept $(0, b)$ y-Intercept

$y = mx + b$ m = slope

② Point-slope (x_1, y_1) pt on line

$y - y_1 = m(x - x_1)$ m = slope

Ex 1 (a) Find the slope of the line between $(3, 2)$ and $(-7, -5)$

(b) Find the eqn of the line (in (a)).

1.3 (cont)

Ex 2 Find the eqn of the line through $(4, -3)$ and $(4, 5)$.

Ex 3 For $4 - 5y + 7x = -10$, find the y-intercept and slope.

Ex 4 Find the eqn of the line with slope -3 and y-intercept $(0, 4)$

1.3 (cont)

Ex 5 Find the eqn of the line through $(1, -5)$ and (a) parallel to $3x - 6y = 5$
(b) perpendicular

Ex 6 Water freezes at 32°F which is 0°C. Water boils at 212°F which is the same as 100°C. What celsius temperature corresponds to 70°F? Write a linear eqn that fits these data.

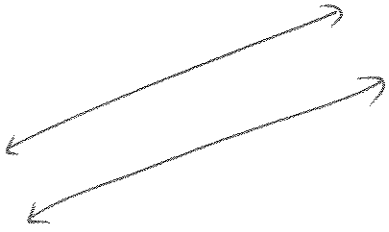
1.4 Systems of Linear Eqns

Vocab

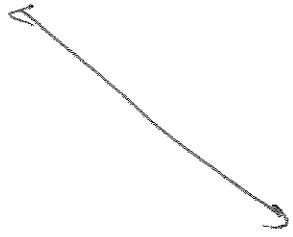
System of eqns:

Soln:

one soln



no solns
(lines are ||)



∞ solns
(lines are the same)

Methods

① substitution

② Elimination

1.4 (cont)

Ex 1 Solve

$$x - \frac{3}{4}y = -9$$
$$\frac{1}{3}x = \frac{1}{4}y - 3$$

Ex 2 Solve

$$3(2x+3y-2) = -x+y$$
$$x+5 = 2-5y$$

1.4 (cont)

Ex 3 Solve $x = -3$, $y = 1$

Ex 4

$$3x + 15y = -6$$
$$-x - 5y = 2$$

Ex 5

$$0.9x + 0.5y = -9.4$$
$$1.8x = -y$$

1.4 (cont)

Ex 6 Solve

$$5z = 15$$
$$x - 2y + 3z = 17$$
$$2x + 3y + z = 12$$

Ex 7 Jack's basketball team scored 41 less than two times the number of pts that Dylan's team scored. The sum of both teams' final pts was 106. How many pts did each team score?