Sec 2.2 Solving Equations and Inequalities

p177

(#41) $x^3 + x + 4 = 0$

$x^3 + x = -4$

$x(x^2 + 1) = -4$

let $f(x) = x^3 + x + 4$

try to graph it

Setup $f(x) = 0$ ↓ x-intercepts.

$x = -1.38$

(#47) $x^4 = 2x^3 + 1$

$x^4 - 2x^3 - 1 = 0$

$(-1)^4 - 2(-1)^3 - 1 = 1 + 2 - 1$

Let $y = x^4 - 2x^3 - 1$ graph it

$x = -0.7167$

$x = 2.107$

$x = -1$ No

(49) $\frac{2}{x+2} = 3$ ∴ Cross-multi

$x \neq -2$

$2 = 3(x+2)$

$2 = 3x + 6$

$-6 \quad -6$

$3x = -4$ ∴ $\boxed{x = -\frac{4}{3}}$

(#51) $\frac{5}{x} = 1 + \frac{3}{x+2}$ $\boxed{x \neq -2, 0}$

$\frac{5}{x} = \frac{x+5}{x+2}$ $\boxed{\frac{A}{B} = \frac{C}{D}}$ cross-mult

$x(x+5) = 5(x+2)$

$x^2 + 5x = 5x + 10$

$x^2 = 10$

$x = \pm\sqrt{10}$ ✓

(#53) $|x-2| = 3$ Key $|x| = M$

$x = \pm M$

$x - 2 = 3$ or $x - 2 = -3$

$\boxed{x = 5}$ or $\boxed{x = -1}$

(#56) $|4x+1| + 2 = 8$

$-2 \quad -2$

$|4x+1| = 6$

$4x+1 = 6$ or $4x+1 = -6$

$\boxed{x = \frac{5}{4}}$ ✓ or $\boxed{x = -\frac{7}{4}}$ ✓

#57 $\sqrt{x-2} = 3$

$\therefore$ Square Both Side.

$x-2 = 9$

$x = 11$ ✓

⚠ $x-2 \geq 0$

$\boxed{x \geq 2}$

Solution to an equation ⟶ one Solution

$x^2 = 1 \therefore \boxed{x = \pm 1}$ ↘ many Solutions

$x = x$ infinite many Solutions

No Solution

$\cancel{x} + 1 = \cancel{x} + 2$

impossible. No Solutions.

$|x| = x$ Solution if $x \geq 0$

$|-3| = (-3)$ NO

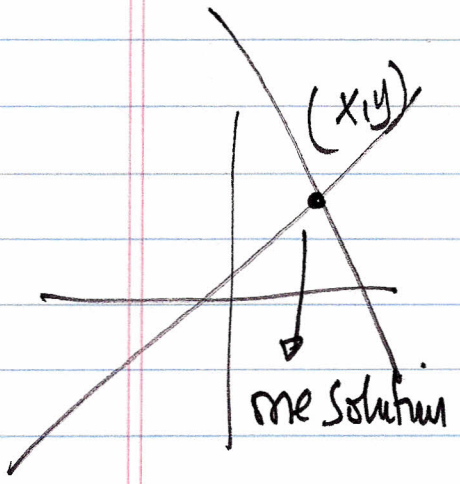
But $|3| = 3$ ✓

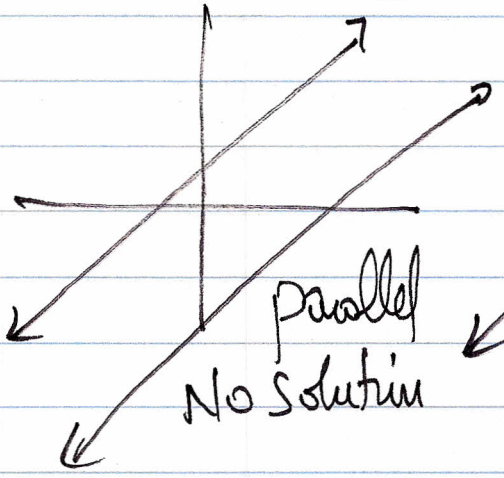
System of equations (Linear).

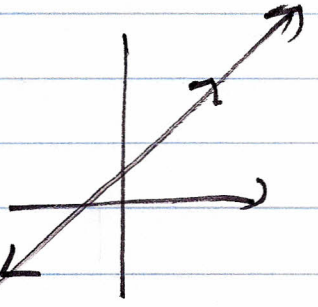
form:

line 1 $ax + by = e$

line 2 $cx + dy = f$







Infinite Solutions either $ax+by=e$ or $cx+dy=f$

Standard form

$3x + y = 7$

slope intercept form.

$$\boxed{y = -3x + 7}$$

dependent.

independent x is free

Solution to this equation are all points satisfie $y = -3x+7$

$(-1, 10)$; $(0, 7)$

$(1, 4)$

point - slope format

$$y - y_2 = m(x - x_2)$$

#63 $y = 2 - x$

$y = 2x - 1$

(1, 1) solution → Solve by graphing.

Substitution

Elimination (linear combination).

By Substitution

$2 - x = 2x - 1$

$+1 + x \quad +x + 1$

$3 = 3x$

$\boxed{x = 1}$ $\boxed{y = 2 - 1 = 1}$

(1, 1) ← point (ordered pair).

#66 $2(x - y = -4) \rightarrow 2x - 2y = -8$

Elimination

$x + 2y = 5$

$-1 - y = -4$

$-y = -3$

$\boxed{y = 3}$

$+ \quad x + 2y = 5$

$3x = -3$

$\boxed{x = -1}$

Answer $(-1, 3)$ ←

$x - y = -4$

$-$

$x + 2y = 5$

$-3y = -9 \quad \therefore \boxed{y = 3}$

(69) $y = x^2 - x + 1$

$y = x^2 + 2x + 4$

$= (x+2)(x\ )$

$b^2 - 4ac = (1)^2 - 4(1)(1) = -3 < 0$

$(2)^2 - 4(1)(4) = -12 < 0$

System of Quadratic equations

Graphing.

Ans $(-1, 3)$ ✓

Substitution

$x^2 - x + 1 = x^2 + 2x + 4$

$-x + 1 = 2x + 4$

$+x - 4 \quad +x - 4$

$-3 = 3x$

$\boxed{x = -1}$ $y = 1 - 2 + 4 = \boxed{3}$

(72) $-5(x - 3y = -2)$

$5x - 2y = 11$

Ans $\left(\frac{37}{13}, \frac{21}{13}\right)$ ✓

Elimination

$-5x + 15y = 10$

$5x - 2y = 11$

$13y = 21$

$\boxed{y = \frac{21}{13}}$

$x = -2 + 3\left(\frac{21}{13}\right)$

$x = \frac{-26 + 63}{13} = \boxed{\frac{37}{13}}$

(76) $y = x$

$y = 2x - x^2$

Ans $(0,0)$ ✓ $(1,1)$ ✓

Substitution $x = 2x - x^2$

$x^2 - x = 0$

$x(x-1) = 0$

$\boxed{x = 0, 1}$