

(1.) $3x^2 - 13x - 10 > 0$ here is the problem

$(3x + 2)(x - 5) = 0$ factor

$3x + 2 = 0$ $x - 5 = 0$ set each factor equal to 0

-2 -2 $+ 5$ $+5$ add this to each side

$\frac{3x = -2}{3}$; $\frac{x = 5}{1}$ add

$\frac{-2}{3}$ $\frac{5}{1}$ divide each side by 3

$x = -2/3$; $x = 5$ cancel

(i.) $3(-1)^2 - 13(-1) - 10 > 0$ [replace x with -1]

[a number less than -2/3]

$3 + 13 - 10 > 0$ multiply

$6 > 0$ combine like terms

result: true

(ii.) $3(0)^2 - 13(0) - 10 > 0$ replace x with 0

[a number between -2/3 and 5]

$-10 > 0$ multiply combine like terms

result: false

(iii.) $3(6)^2 - 13(6) - 10 > 0$ replace x with 6

[a number greater than 5]

$108 - 78 - 10 > 0$ multiply

$20 > 0$ combine like terms

result: true

results: $(-\infty, -2/3) \cup (5, \infty)$

[this is the interval notation]

(2.) $2x^2 > x + 6$ here is the problem

$-x \quad -x$ subtract x from each side

$$\frac{2x^2 - x > 6}{\quad}$$

subtract

$-6 \quad -6$ subtract 6 from each side

$$\frac{2x^2 - x - 6 > 0}{\quad}$$

subtract

$$(2x + 3)(x - 2) = 0$$

factor

$$2x + 3 = 0 \quad x - 2 = 0 \quad \text{set each factor equal to 0}$$

$-3 \quad -3 \quad + \quad 2 \quad +2$ add this to each side

$$\frac{2x = -3}{\quad}; \quad \frac{x = 2}{\quad} \quad \text{add}$$

$$\frac{\quad}{2} \quad \frac{\quad}{2} \quad \text{divide each side by 2}$$

$$x = -3/2; \quad x = 2 \quad \text{cancel}$$

(i.) $2(-2)^2 > -2 + 6$ replace x with -2 [a number less than $-3/2$]

$$8 > 4 \quad \text{multiply and combine like terms}$$

result: true

(ii.) $2(0)^2 > 0 + 6$ replace x with 0 [a number between $-3/2$ & 2]

$$0 > 6 \quad \text{multiply combine like terms}$$

result: false

(iii.) $2(3)^2 > 3 + 6$ [replace x with 3] [a number greater than 2]

18 > 9 multiply combine like terms

result: true

results: (-infinity -3/2) U (2, infinity)

[this is the interval notation]

(3.) $x^2 + 2x - 8 < 0$ here is the problem

$(x + 4)(x - 2) = 0$ factor

$x + 4 = 0$ $x - 2 = 0$ set each factor equal to 0

-4 -4 + 2 + 2 add this to each side

 $x = -4$; $x = 2$ add

(i.) $(-5)^2 + 2(-5) - 8 < 0$ [replace x with -5]

[a number less than -4]

$25 - 10 - 8 < 0$ multiply

$7 < 0$ combine like terms

result: false

(ii.) $0^2 + 2(0) - 8 < 0$ [replace x with 0]

[a number between -4 and 2]

$-8 < 0$ multiply combine like terms

result: true

(iii.) $(3)^2 + 2(3) - 8 < 0$ [replace x with 3]

[a number greater than 2]

$9 + 6 - 8 < 0$ multiply

$7 < 0$ combine like terms

result: false

results: $(-4, 2)$ this is the interval notation

(4.) $(x + 1)/(x - 2) > 0$ here is the problem

$x + 1 = 0$ $x - 2 = 0$ set each factor equal to 0

$-1 -1$ $+ 2$ $+2$ add this to each side

$x = -1$; $x = 2$ add

(i.) $(-2 + 1)/(-2 - 2) > 0$ replace x with -2

[a number less than -1]

$-1/-4 > 0$ add and subtract

$1/4 > 0$ cancel minus signs

result: true

(ii.) $(0 + 1)/(0 - 2) > 0$ replace x with 0

[a number between -1 and 2]

$-1/2 > 0$ combine like terms, divide

result: false

(iii.) $(3 + 1)/(3 - 2) > 0$ replace x with 3

[a number greater than 3]

$4 > 0$ add subtract and divide

result: true

results: $(-\infty, -1) \cup (2, \infty)$

[this is the interval notation]

(5.) $x^2 - 5x + 4 \leq 0$ here is the problem

$(x - 1)(x - 4) = 0$ factor

$x - 1 = 0$ $x - 4 = 0$ set each factor equal to 0

+ 1 + 1 + 4 + 4 add this to each side

$x = 1$; $x = 4$ add

(i.) $0^2 - 5(0) + 4 \leq 0$ replace x with 0

[a number less than 1]

$4 \leq 0$ multiply, combine like terms

result: false

(ii.) $(2)^2 - 5(2) + 4 \leq 0$ replace x with 2

[a number between 1 and 4]

$4 - 10 + 4 \leq 0$ multiply

$-2 \leq 0$ combine like terms

result: true

(iii.) $(5)^2 - 5(5) + 4 \leq 0$ replace x with 5

[a number greater than 4]

$4 \leq 0$ multiply combine like terms

result: false

results: $[1, 4]$ this is the interval notation

(6.) $2x^2 - 3x - 5 > 0$ here is the problem

$(2x - 5)(x + 1) = 0$ factor

$2x - 5 = 0$ $x + 1 = 0$ set each factor equal to 0

$+ 5 + 5$ $- 1 - 1$ add this to each side

$\frac{2x = 5}{2}$; $\frac{x = -1}{1}$ add

$\frac{x = 5/2}{2}$ divide each side by 2

$x = 5/2$; $x = -1$ cancel

(i.) $2(-2)^2 - 3(-2) - 5 > 0$ replace x with -2

[a number less than -1]

$8 + 6 - 5 > 0$ multiply

$9 > 0$ combine like terms

result: true

(ii.) $2(0)^2 - 3(0) - 5 > 0$ replace x with 0

[a number between -1 and 5/2]

$-5 > 0$ multiply combine like terms

result: false

(iii.) $2(3)^2 - 3(3) - 5 > 0$ replace x with 3

[a number greater than 5/2]

$18 - 9 - 5 > 0$ multiply

$4 > 0$ combine like terms

result: true

results: $(-\infty, -1) \cup (5/2, \infty)$

(7.) $x^2 - x - 2 \leq 0$ here is the problem

$(x + 1)(x - 2) = 0$ factor

$x + 1 = 0$ $x - 2 = 0$ set each factor equal to 0

$-1 -1$ $+ 2 +2$ add this to each side

$x = -1$; $x = 2$ add

(i.) $(-2)^2 - (-2) - 2 \leq 0$ replace x with -2

[a number less than -1]

$4 + 4 - 2 \leq 0$ multiply

$6 \leq 0$ combine like terms

result: false

(ii.) $(0)^2 - 0 - 2 \leq 0$ replace x with 0

[a number between -1 and 2]

$-2 \leq 0$ multiply combine like terms

result : true

(iii.) $(3)^2 - 3 - 2 \leq 0$ replace x with 3

[a number greater than 2]

$4 \leq 0$ combine like terms

result: false

results: $[-1, 2]$ this is the interval notation

(8.) $x^2 > 4$ here is the problem

$x = 2$ $x = -2$ take square roots

$(-3)^2 > 4$; $(0)^2 > 4$; $3^2 > 4$ [make substitutions]

$9 > 4$; $0 > 4$; $9 > 4$ square

results: $(-\infty, 2) \cup (2, \infty)$

[this is the interval notation]

(9.) $2x^2 + 3x + 2 < 0$ here is the problem

$b^2 - 4ac$ use the discriminant formula

= $3^2 - 4(2)(2)$ make make substitutions

= $9 - 16$ multiply

= -7 subtract

result: no zeros

results: no solution

(10.) $x^2 - 6x + 4 > 0$ here is the problem

$+5 + 5$ add 5 to each side

$x^2 - 6x + 9 = 5$ add

$(x - 3)^2 = 5$ add

$x - 3 = \sqrt{5}$ $x - 3 = -\sqrt{5}$ take sq roots

$+ 3 + 3$ $+ 3 + 3$ add 3 to each side

$x = 3 + \sqrt{5}$; $x = 3 - \sqrt{5}$ add

(i.) $0^2 - 6(0) + 4 > 0$ replace x with 0

[a number less than $3 - \sqrt{5}$]

$4 > 0$ multiply combine like terms

result: true

(ii.) $3^2 - 6(3) + 4 > 0$ replace x with 3

[a number between $3 - \sqrt{5}$ and $3 + \sqrt{5}$]

$9 - 18 + 4 > 0$ multiply

$-5 > 0$ combine like terms

result: false

(iii.) $6^2 - 6(6) + 4 > 0$ replace x with 6

[a number greater than $3 + \sqrt{5}$]

$4 > 0$ multiply combine like terms

result: true

results: $(-\infty, 3 - \sqrt{5}) \cup (3 + \sqrt{5}, \infty)$