$\boxed{13.5}$

$$\frac{-x-3}{x+2} \le 0$$

vs

$$(-x-3)(x+2) \ge 0$$

$+$

Zeros: $x = -3$

$x = -2$

$x = -3$ zero $\}$ critical #

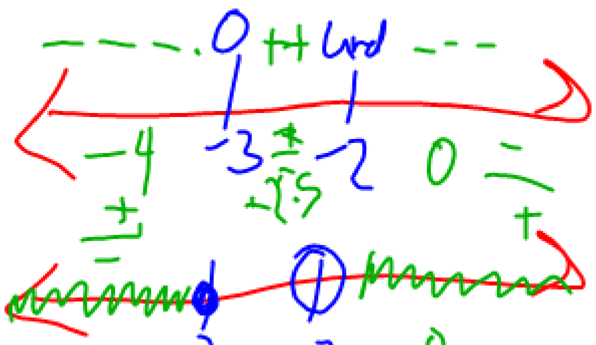
$x \neq -2$ und

intervals

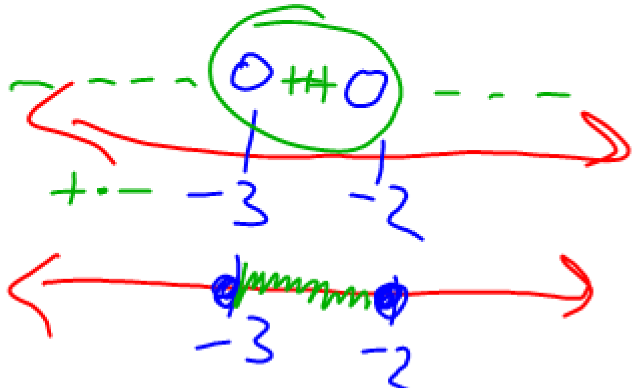
$(-\infty, -3)$

$(-3, -2)$

$(-2, \infty)$



$(-\infty, -3] \cup (-2, \infty)$



$[-3, -2]$

13.4

ate substitution. When necessary, check propo

21. $(2x-5)^2+4(2x-5)+3=0$

134

Solve using u-substitution

let $\boxed{u = 2x-5}$

$u^2+4u+3=0$

$(u+3)(u+1)=0$

$u=-3 \quad u=-1$

$u=-3$

$2x-5=-3$

$2x=2$

$x=1$

$u=-1$

$2x-5=-1$

$2x=4$

$x=2$

13.1 Solving Quadratics

1) Factoring

2) Completing the Square

13.2 3) Quadratic Formula

(13.) Solve

$$\frac{5(\boxed{x}+1)^2}{5} = \frac{10}{5}$$

$$\sqrt{(x+1)^2} = \pm\sqrt{2}$$

$$x+1 = \pm\sqrt{2}$$

$$x = -1 \pm \sqrt{2}$$

Solve By Completing the Square

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

$$x^2 + 3x + \frac{9}{4} = -4 + \frac{9}{4}$$

$$\frac{1}{2}\left(\frac{3}{1}\right) = \left(\frac{3}{2}\right)^2$$

$$\sqrt{\left(x+\frac{3}{2}\right)^2} = \pm\frac{\sqrt{-7}}{\sqrt{4}}$$

$$x + \frac{3}{2} = \frac{\pm\sqrt{7}\,i}{2}$$

$$\boxed{x = -\frac{3}{2} \pm \frac{\sqrt{7}}{2}i}$$

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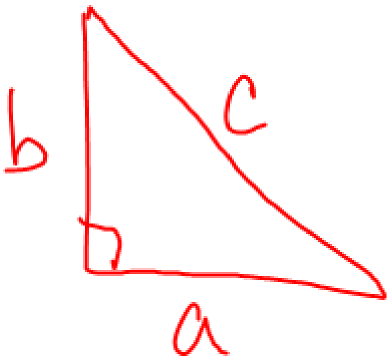


$$a^2+b^2=c^2$$

13.2

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

discriminant

vertex Formula

$b^2 - 4ac$

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

16

Solve $3x^2 + 2x - 1 = 0$ use Q.F.

$$x = \frac{-(2) \pm \sqrt{2^2 - 4(3)(-1)}}{2(3)} = \frac{-2 \pm \sqrt{16}}{6} = \frac{-2 \pm 4}{6}$$

-1

$\frac{1}{3}$

1 or 2 Real complex

determine the # and type of solutions

Ration. | Irrat.

Real

$4x^2 - 10x - 2 = 0$

$\boxed{b^2 - 4ac} = (-10)^2 - 4(4)(-2)$

$= 100 + 32$

$= {}^{+}132$

2 irrational solutions

Graphing

133

$y = {}^{+}1x^2 - 2x - 8$

Complete the square to write in **Vertex Form**

$y = a(x-\underline{h})^2 \underline{+k}$

1. find the Vertex

$y + 8 + 1 = x^2 - 2x + 1$

$y + 9 = (x-1)^2$

$y = {}^{+}1(x-1)^2 - 9$

$v(1, -9)$ <u>min</u>

$y = (x-1)^2 - 9$

① ②
$V(1, -9)$ min

$x = 1$

x-intercepts

let $y = 0$

$0 = (x-1)^2 - 9$

$\pm\sqrt{9} = \sqrt{(x-1)^2}$

$\pm 3 = x - 1$

$1 \pm 3 = x$

$x = 4, -2$

y-intercept

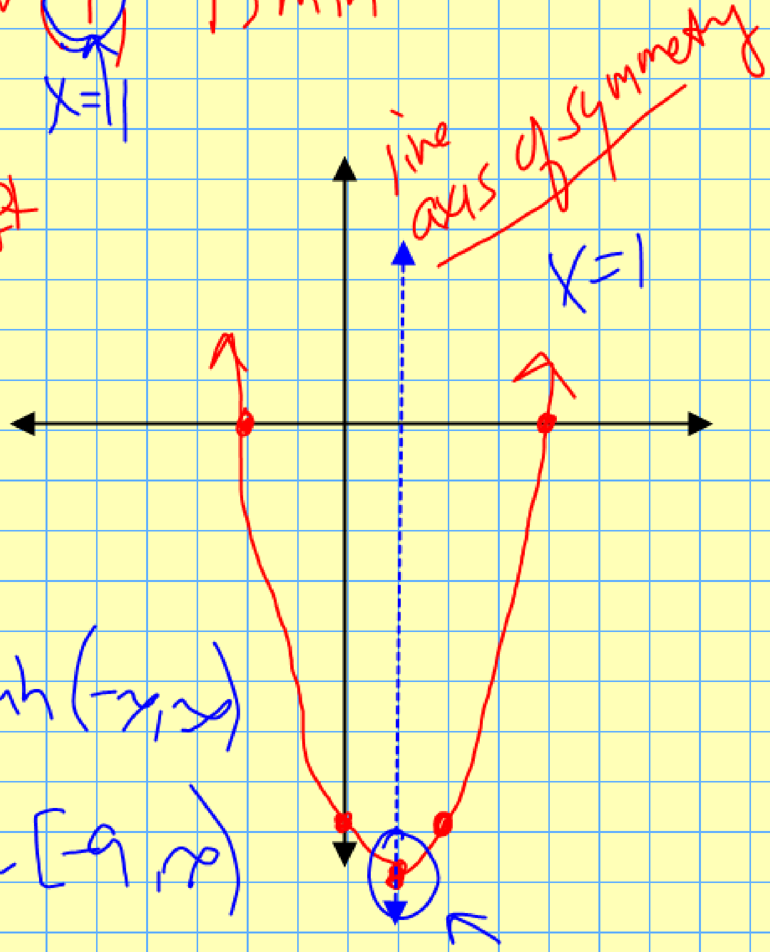
let $x = 0$

$y = (-1)^2 - 9$

$y = -8$

Domain $(-\infty, \infty)$

Range $[-9, \infty)$



17. $f(x) = x^2 - 2x - 3$

A baseball player hits a pop fly into the air. The function

$$s(t) = -16t^2 + 64t + 5$$

models the ball's height above the ground, $s(t)$, in feet, t seconds after it is hit. Use the function to solve Exercises 18–19.

18. When does the baseball reach its maximum height? What is that height?

19. After how many seconds does the baseball hit the ground? Round to the nearest tenth of a second.

A baseball player hits a pop fly into the air. The function

$$s(t) = -16t^2 + 64t + 5$$

models the ball's height above the ground, $s(t)$, in feet, t seconds after it is hit. Use the function to solve Exercises 18–19.

18. When does the baseball reach its maximum height? What is that height?

t = time

$s(t)$ = height above ground

Vertex Formula

$$t = \frac{-b}{2a} = \frac{-64}{2(-16)} = 2 \text{ seconds}$$

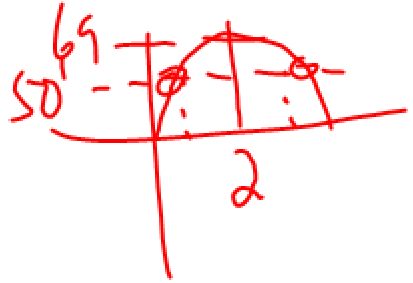
Max height $s(2) = -16(2)^2 + 64(2) + 5 = \underline{69 \text{ ft}}$

(3)

A baseball player hits a pop fly into the air. The function

$$s(t) = -16t^2 + 64t + 5$$

models the ball's height above the ground, $s(t)$, in feet, t seconds after it is hit. Use the function to solve Exercises 18–19.



When does the ball reach 50 ft high

$$50 = -16t^2 + 64t + 5$$

$$0 = -16t^2 + 64t - 45$$

$$t = \frac{-(64) \pm \sqrt{(64)^2 - 4(-16)(-45)}}{(2(-16))} =$$

≈ 1.0 ~~se~~

≈ 3.1 sec