Solve & graph

13.5

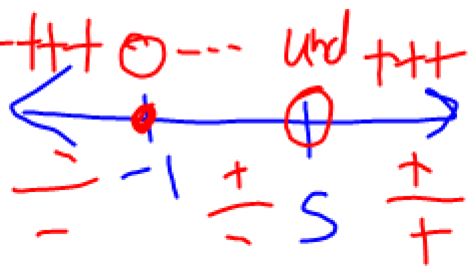
$$\frac{x+1}{x-5} \le 0$$

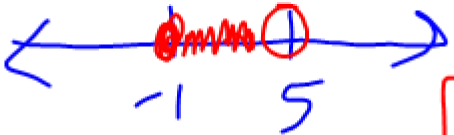
−

Zero : $x = -1$

und : $x \ne 5$

interval	test #
$(-\infty, -1)$	-2
$(-1, 5)$	0
$(5, \infty)$	6



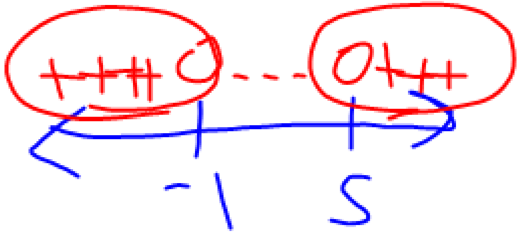


$[-1, 5)$

$$(x+1)(x-5) \ge 0$$

+

Zeros: $x = -1$, $x = 5$



$(-\infty, -1] \cup [5, \infty)$

13.4 u-subs

23. $x^{\frac{2}{3}} - 9x^{\frac{1}{3}} + 8 = 0$

Solve using u-Substitution

let $\boxed{u = x^{\frac{1}{3}}}$

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

$u^2 - 9u + 8 = 0$

$(u-8)(u-1) = 0$

$u = 8 \qquad u = 1$

$u = 8 \qquad\qquad u = 1$

$x^{\frac{1}{3}} = 8 \qquad x^{\frac{1}{3}} = 1$

$\sqrt[3]{x}^{\,3} = 8^3 \qquad \sqrt[3]{x}^{\,3} = 1^3$

$x = 512 \qquad x = 1$

13.1 Quadratics

- Square root method
- Complete the square

$$\frac{3(x-1)^2}{3} = \frac{6}{3}$$

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

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

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

By completing the square

$$1x^2 - 5x + 1 = 0$$

$$\underbrace{x^2 - 5x + \frac{25}{4}}_{} = -\frac{4}{4} + \frac{25}{4}$$

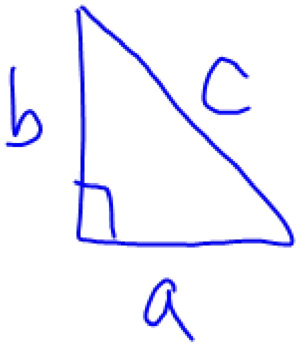
$$\frac{1}{2}\left(-\frac{5}{1}\right)$$

$$\left(-\frac{5}{2}\right)^2$$

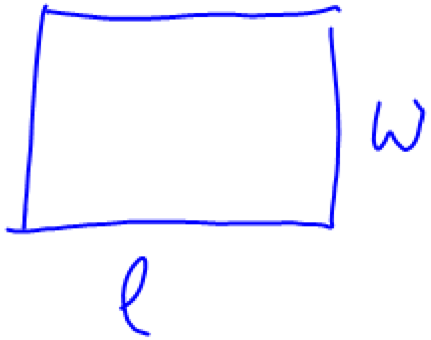
$$\sqrt{\left(x-\frac{5}{2}\right)^2} = \pm\frac{\sqrt{21}}{\sqrt{4}}$$

$$x - \frac{5}{2} = \frac{\pm\sqrt{21}}{2}$$

$$x = \frac{5}{2} \pm \frac{\sqrt{21}}{2}$$



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



$$A = l \cdot w$$

$$P = 2l + 2w$$

13.2 Quadratic Formula

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

$\overset{a}{2}x^2 \overset{b}{-3}x \overset{c}{-1} = 0$ Solve

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

$$x = \frac{3 \pm \sqrt{9+8}}{4} = \frac{3 \pm \sqrt{17}}{4}$$

b^2-4ac discriminant

$x = \frac{-b}{2a}$ vertex Formula

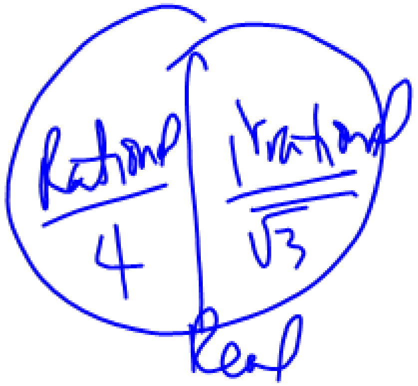
Find the # & type of solutions of

$$2x^2 - 8x - 4 = 0$$

$$b^2 - 4ac = (-8)^2 - 4(2)(-4)$$

$$64 + 32$$

$$96$$



2 irrational solns

$\{1+3\sqrt{2},\ 1-3\sqrt{2}\}$

find a Quadratic equation with these solns

13.2

$x = 1+3\sqrt{2}$ $\qquad$ $x = 1-3\sqrt{2}$

$x-1-3\sqrt{2} = 0$ $\qquad$ $x-1+3\sqrt{2} = 0$

$(x-1-3\sqrt{2})(x-1+3\sqrt{2}) = 0$

$x^2 - x + 3\sqrt{2}x - 18 + 3\sqrt{2}$

$\quad - x - 3\sqrt{2}x + 1 - 3\sqrt{2}$ $\qquad -9\cdot 2$

$x^2 - 2x - 17 = 0$

15. The function

$$f(x) = -0.5x^2 + 4x + 19$$

models the number of people in the United States, $f(x)$, in millions, receiving food stamps x years after 1990. In which year(s) were 20 million people receiving food stamps? Use a calculator and round to the nearest year(s).

In 1990 & in 1998 there were 20 million people on food stamps

$$20 = -0.5x^2 + 4x + 19$$

$$0 = -0.5x^2 + 4x - 1$$

$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(-.5)(-1)}}{2(-.5)} = \frac{-4 \pm \sqrt{16 - 2}}{-1}$$

$$= +4 \pm \sqrt{14}$$

$$4 + \sqrt{14} = 7.7 \approx 8$$

$$4 - \sqrt{14} = 0.2 = 0$$

on

$$f(x) = -0.5x^2 + 4x + 19$$

13.3

in what year was it a $\boxed{\text{max}}$?

people?

Vertex Form

$$x = \frac{-b}{2a} = \frac{-4}{2(-0.5)}$$

$$= 4$$

in 1994 the # of people on food stamps was max.

$$f(4) = -0.5(4)^2 + 4(4) + 19 = \boxed{27 \text{ million people}}$$

B3 ~~Graphing~~

$y = a(x-h)^2 + k$

$\boxed{\text{Vertex Form}}$

$y = 1x^2 - 2x - 3$

(1) Find the vertex by completing the square

$y + 3 + 1 = x^2 - 2x + 1$

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

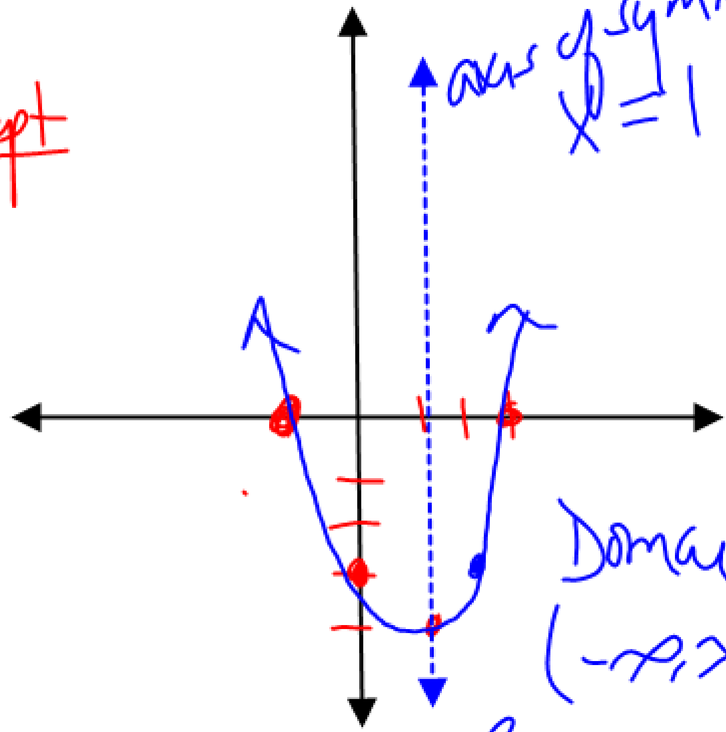
$y = (x-1)^2 - 4$

$V(1, -4)$ min

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

$x = 1$

V $(1, -4)$ min



axis of symmetry
$x = 1$

Domain
$(-\infty, \infty)$

Range $[-4, \infty)$

X-intercepts

let $y = 0$

$0 = (x-1)^2 - 4$

$\pm\sqrt{4} = \sqrt{(x-1)^2}$

$\pm 2 = x - 1$

$x = 1 \pm 2 = 3, -1$

y-intercept

let $x = 0$

$y = (-1)^2 - 4$

$y = -3$