

Q's on 8.1

56. $f(x) = \frac{1}{4}x^2 - x + 5$ $1 \div \frac{1}{2}$ multiply by the reciprocal

$$x = \frac{-b}{2a} \quad x = \frac{1}{\frac{2}{1}(\frac{1}{2})} = \frac{1}{2} = \frac{1}{1} \cdot \frac{2}{1} = 2$$

$x = 2$

$$\begin{aligned} f(2) &= \frac{1}{4}(2)^2 - 2 + 5 \\ &= \frac{1}{4} \cdot \frac{4}{1} - 2 + 5 \\ &= 1 - 2 + 5 \\ &= 6 - 2 \\ &= 4 \end{aligned}$$

Can't clear fractions in a function because you only have one side

Can clear ~~the~~ fractions when solving an equation. You can do operations to both sides.

x	y
0	5
1	$\frac{17}{4}$ or $4\frac{1}{4}$
Vertex \rightarrow 2	4
3	$4\frac{1}{4}$
4	5

$$\begin{aligned} f(0) &= \frac{1}{4}(0)^2 - 0 + 5 \\ &= 0 - 0 + 5 \\ &= 5 \end{aligned}$$

$$\begin{aligned} f(1) &= \frac{1}{4}(1)^2 - 1 + 5 \\ &= \frac{1}{4} \cdot \frac{1}{1} - 1 + 5 \\ &= \frac{1}{4} - 1 + 5 \end{aligned}$$

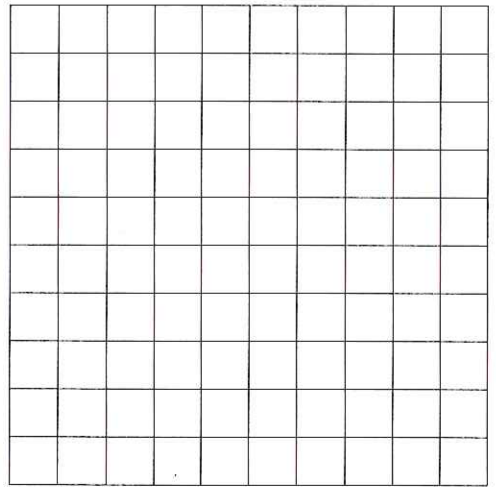
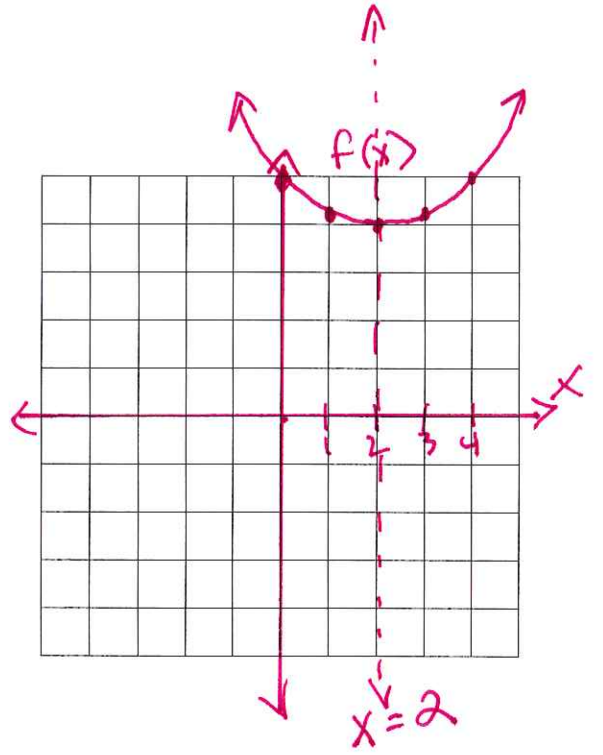
$$\begin{aligned} f(3) &= \frac{1}{4}(3)^2 - 3 + 5 \\ &= \frac{1}{4} \cdot \frac{9}{1} + 2 \\ &= \frac{9}{4} + 2 \\ &= 2\frac{1}{4} + 2 \\ &= 4\frac{1}{4} \end{aligned}$$

$$\begin{aligned} f(4) &= \frac{1}{4}(4)^2 - 4 + 5 \\ &= \frac{4}{1} - 4 + 5 \\ &= 5 \end{aligned}$$

$$\begin{aligned} &= \frac{1}{4} + \frac{4 \cdot 4}{1 \cdot 4} \\ &= \frac{1}{4} + \frac{16}{4} \\ &= \frac{17}{4} \end{aligned}$$

$4\frac{1}{4} \rightarrow$

#51



41. $f(x) = -(x+2)^2$ foil then distribute the -1.

43. $f(x) = x^2 + x - 2$

$$x = \frac{-b}{2a}$$
$$= \frac{-1}{2(1)} = -\frac{1}{2}$$

	X	y
1	-2	0
$\frac{1}{2}$	-1	-2
$\frac{1}{2}$	-.5	-2.25
1	0	-2
1	1	0

$\Delta t b l = .5$

39. $f(x) = (x-1)^2$

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

47. $f(x) = 2x - x^2$

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

$a = -1$ $b = 2$ $c = 0$

Section 8.2 - Parabolas and modeling

Vertex form of a Parabola

graph $y_1 = x^2$ vertex is $(0,0)$

$y_2 = (x+2)^2 + 1$ $(-2,1)$

Vertex form

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

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

The vertex is (h,k)

ex: The vertex is $(3,4)$ $a=1$

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

The vertex is $(-7,9)$ $a=1$

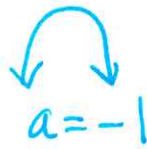
$$\begin{aligned} y &= 1(x+7)^2 + 9 \\ &= 1(x+7)^2 + 9 \end{aligned}$$

The x-coordinate is the opposite of the sign in the parentheses

The vertex is $(2,-6)$ $a=1$

$$y = 1(x-2)^2 - 6$$

46. opens downward
 vertex $(-1, -2)$
 $a = -1$



$a > 0$
 opens upward
 $a < 0$
 opens downward

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

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

50. $V = (2, -3)$
 opens up $a = 1$

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

How to put a parabola in vertex form
 (from standard form)
 $y = ax^2 + bx + c$

Putting a parabola in standard form 8.2

Solving Equations 8.3

66. $y = x^2 + 4x + 1$ keep everything on the same side $(\frac{1}{2}b)^2$

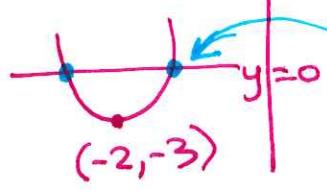
$$= x^2 + 4x + \frac{2^2}{2} - \frac{2^2}{2} + 1$$

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

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

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

Vertex: $(-2, -3)$



10:25

ex: $x^2 + 4x + 1 = 0$

$$x^2 + 4x + \frac{2^2}{2} = -1 + \frac{2^2}{2}$$

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

$$\sqrt{(x + 2)^2} = \pm\sqrt{3}$$

$$x + 2 = \pm\sqrt{3}$$

$$x = -2 \pm \sqrt{3}$$

$\{-2 \pm \sqrt{3}\}$
 x-intercepts

Square root property

Completing the square when a is not 1.

78.

$$y = -3x^2 + 6x + 1$$

$$a = -3$$

kick out and distribute

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

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

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

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

Vertex $(1, 4)$
opens downward
 $a < 0$

$$\frac{1}{2}b^2 = 1^2$$

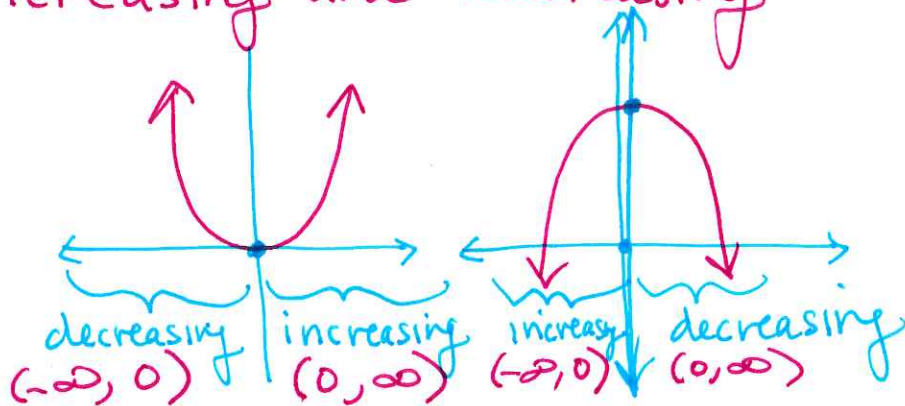
When solving divide both sides by a .

For vertex form factor out the a from the 1st 2 terms

$$\begin{aligned} & x^2 - 2x + 1^2 \\ & (x - 1)(x - 1) \\ & x^2 - x - x + 1 \\ & x^2 - 2x + 1 \end{aligned}$$

Example 6 in the book

Increasing and Decreasing



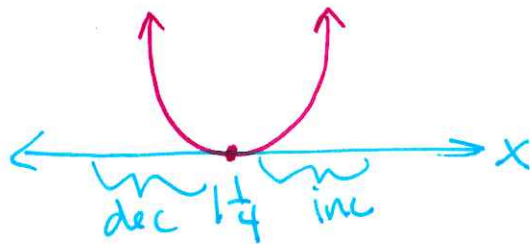
On what intervals^(*) is the parabola increasing or decreasing

x-intervals

98. $y = 2x^2 - 5x - 2$

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

$$= \frac{5}{2(2)} = \frac{5}{4}$$



only need the x \leftarrow x of the vertex

Decreasing on $(-\infty, 1\frac{1}{4})$

Increasing on ~~$(-\infty, 1\frac{1}{4})$~~
 $(1\frac{1}{4}, \infty)$

~~Sketch~~

Checkpoint 4: 8.1 graphing parabolas
vertex

8.2 only completing the
square when $a=1$

} with
calculator

Try supplement 8.2, 8.3