TH-A2 Algebra 2 Week 19

5-1 Modeling Data with Quadratic functions

Quadratic function

1.) Exponents must be whole numbers (nondecimal/nonfraction positives)

2.) Highest degree term must be (2)

Exponents: 2, 1, 0

$f(x) = ax^2 + bx + c$ ← squared

quadrilateral

quadratic

square

$(x+5)(x+9)(x-3)$

not quadratic

x^3

$x^2 + 5x + 9x + 45$

$(x^2 + 14x + 45)(x-3)$

x^3

① $f(x) = 3(x-1) + 3$

$3x - 3 + 3 = 3x$ not quadratic

② $f(x) = (x-4)(x+5)$

$x^2 + 5x - 4x - 20$

$x^2 + x - 20$ yes.

③ $f(x) = 2(x+2)^2 - 2x^2$

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

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

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

$2x^2 + 8x + 8 - 2x^2 = 8x + 8$ not quadratic

④ $f(x) = 4x(x-1) + 3x$

$4x^2 - 4x + 3x$

$4x^2 - x$ yes!

$(-1, 12)$, $(2, 3)$, $(3, 4)$

x $f(x)$ x $f(x)$ x $f(x)$

$f(x) = ax^2 + bx + c$

$(-1, 12)$

x $f(x)$

$f(x) = ax^2 + bx + c$

$12 = a(-1)^2 + b(-1) + c$

$12 = a - b + c$

$(2, 3)$

x $f(x)$

$f(x) = ax^2 + bx + c$

$3 = a(2)^2 + b(2) + c$

$3 = 4a + 2b + c$

$(3, 4)$

$f(x) = ax^2 + bx + c$

$4 = a(3)^2 + b(3) + c$

$4 = 9a + 3b + c$

$f(x) = ax^2 + bx + c$

① $12 = a - b + c$

② $3 = 4a + 2b + c$

③ $4 = 9a + 3b + c$

② $3 = 4a + 2b + c$

① $-12 = -a + b - c$

$-9 = 3a + 3b$

$\frac{-9}{3} = \frac{3a}{3} + \frac{3b}{3}$

$-3 = a + b$

③ $4 = 9a + 3b + c$

② $-3 = 4a + 2b + c$

$1 = 5a + b$

$(+3 = -a + b)$

$1 = 5a + b$

$\frac{4}{4} = \frac{4a}{4}$

$a = 1$

$1 = 5a + b$

$1 = 5(1) + b$

$1 = 5 + b$

$-5 \quad -5$

$-4 = b$

$12 = a - b + c$

$12 = 1 - (-4) + c$

$12 = 1 + 4 + c$

$12 = 5 + c$

$-5 \quad -5$

$7 = c$

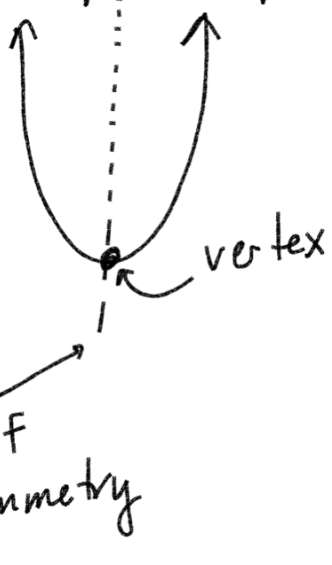
$f(x) = ax^2 + bx + c$

$f(x) = x^2 - 4x + 7$

5-2 Properties of Parabolas

$f(x) = ax^2 + bx + c$

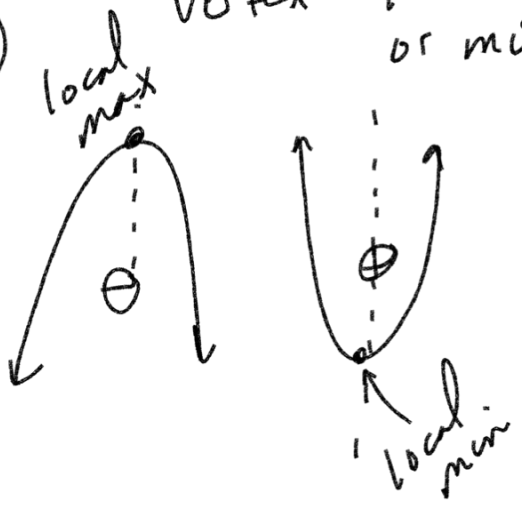
Shape of parabola

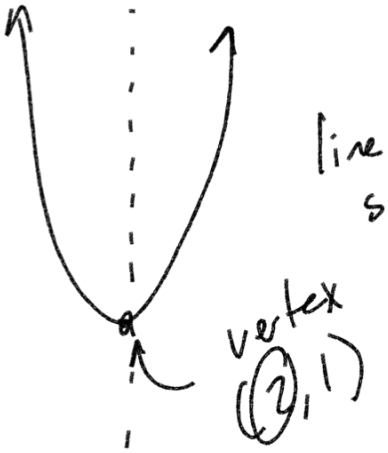


vertex: (h, k)

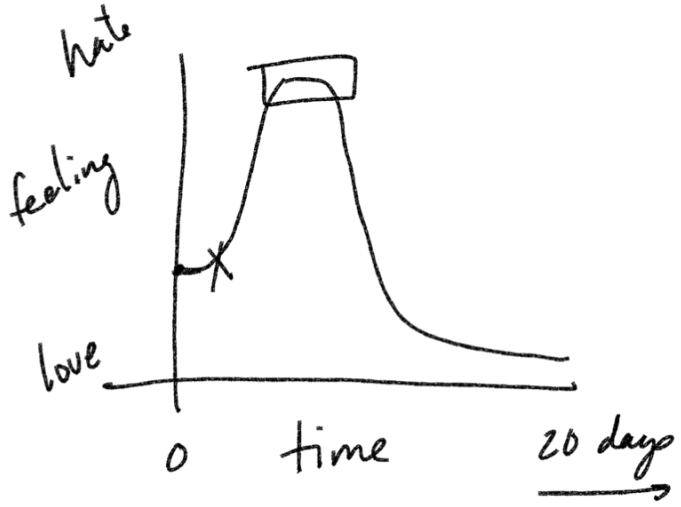
line of symmetry $x = h$

Vertex - local max or min





line of symmetry $x = 2$



$$\left\{ \text{vertex} \left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right) \right) \right\}$$

$f(x) = ax^2 + bx + c$

$$\left\{\text{vertex}\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)\right\}$$

$f(x) = 1x^2 - 4x + 7$

$a = 1 \quad b = -4 \quad c = 7$

$f(x) = ax^2 + bx + c$

Vertex: $\frac{-b}{2a} \quad \frac{-(-4)}{2(1)} = \frac{4}{2} = 2$

vertex: $(2, 3)$

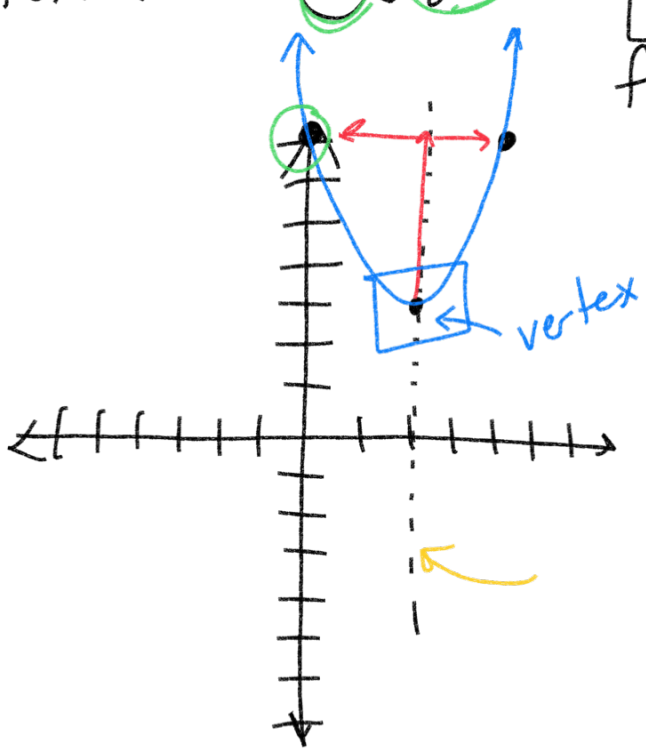
$f(x) = x^2 - 4x + 7$ ← y-intercept

$f(x) = x^2 - 4x + 7$ ↑ + ↓ −

$f(2) = (2)^2 - 4(2) + 7$

$4 - 8 + 7$

$-4 + 7 = 3$



line of symmetry

$x = 2$

$f(x) = 1x^2 + 8x + 11$ (a, b, c)

1) Find vertex $(h, k) = \left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

$h = \frac{-8}{2(1)} = \frac{-8}{2} = -4$

$a = 1$

$b = 8$

$c = 11$

$x^2 + 8x + 11$

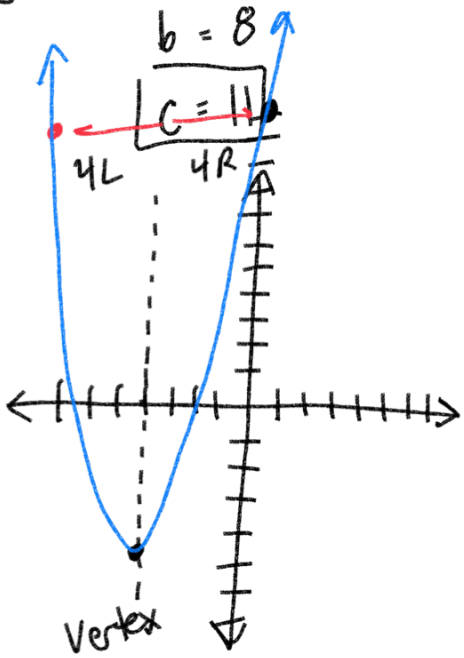
$(-4)^2 + 8(-4) + 11$

$16 - 32 + 11$

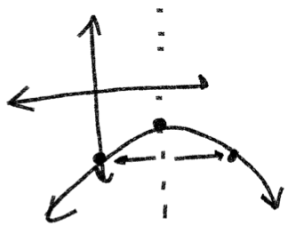
$-16 + 11$

-5

vertex $(-4, -5)$



1) find vertex ✓
2.) find line of symmetry ✓
3.) find y-intercept ✓
4.) graph



line of symmetry $x = -4$

HW
Ch 5.2 evens
Supplemental WS
Online HW 19 & Feb 18th
Quiz 19
Ch 3 Test due ASAP
HW/Quiz 18 due Feb 14th