7.6 Notes

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Section 7.6 – Vertex Form

- Vertex Form
  - $y = a(x - h)^2 + k$
    - Vertex: (h, k)
    - Axis of Symmetry: x = h
    - Parabola opens up when $a > 0$. The minimum value of the
    - Parabola down up when $a < 0$. The maximum value of the
    - Can tell you if there are one, two, or no zeros.
      - Two Zeros: the graph has a positive value or 0 for h value for k.
      - One Zero: the graph has no value for k and h is 0.
      - No Zeros: the graph has a negative value for h and k.
  - Benefits: you sketch a graph more easily from this form.
  - Drawbacks: looks outlandishly hard. (But it isn't, so this doesn't act

7.6 Examples

1. Sketch the following function: $f(x) = 2(x - 3)^2 - 4$.

Vertex: $(3, -4)$

$f(0) = 2(0-3)^2 - 4$

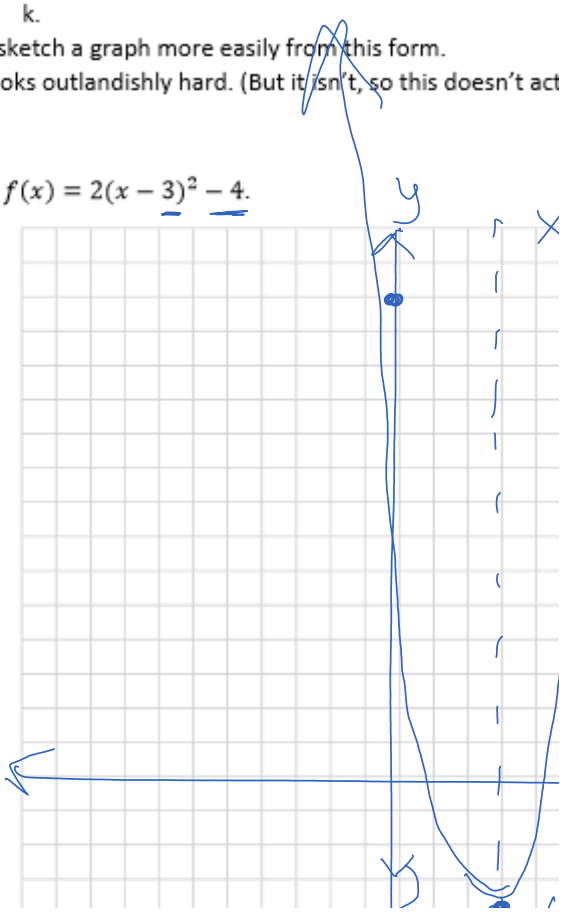
$= 2(-3)^2 - 4$

$= 18 - 4$

$= 14$

$(0, 14)$

AoS $\Rightarrow x = 3$



7.6 Continued

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3. A soccer ball is kicked from the ground. After 2 seconds, the ball reaches its maxim
20 m. It lands on the ground after 4 seconds.

a. Determine the quadratic function that models the height of the kick.

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

$h = a(x-t)^2 + h$ → y-intercept / "c value"

$h = a(x-2)^2 + 20$

$0 = a(4-2)^2 + 20$

$0 = a(4) + 20$

$-20 = 4a$

$-5 = a$

$h = -5(x-2)^2 + 20$

b. Determine any restrictions on the domain and range for this problem.

$\{t \mid t \geq 0, t \in \mathbb{R}\}$

$\{h \mid \geq 0, h \in \mathbb{R}\}$

c. What was the height of the ball at 1 second?

$h = -5(1-2)^2 + 20$

$h = -5(-1)^2 + 20$

$h = -5(1) + 20$

$h = -5 + 20$

$h = 15$

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15 m o

d. When is the ball at the same height on the way down?

Option 1: solve for x (factoring + stuff)

Option 2: Line of sym (aka the ea

$x = 2$ is L.o.S (vertex w

(1, 15) $2 - 1 = 1$ (3, 1

↑ ↑

1 sec 15 m $2 + 1 = 3$