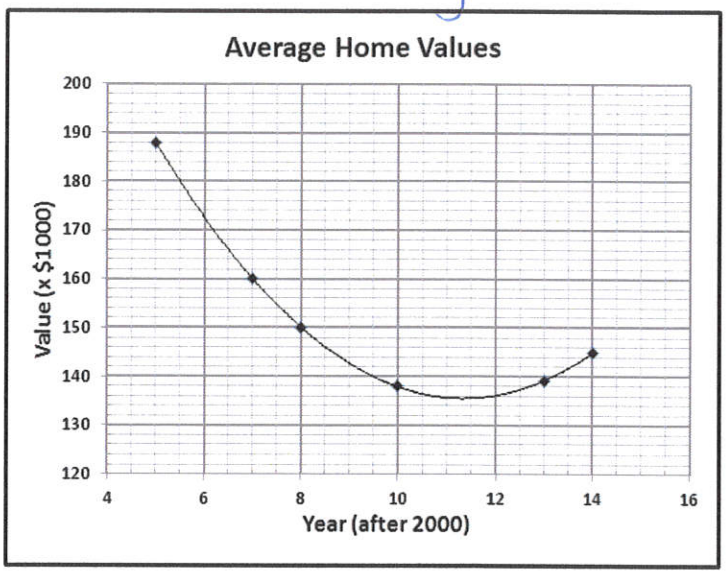
Key

Mth 96 Chapter 2 Review

- Justify and show the means by which you arrive at your answers for full credit.
- Place a **box** around your final answer.
- Answers must be labeled for full credit.

1. Consider the data and graph for the average home value in Oregon over the past decade.

Year (after 2000)	Average Home Value
5	$188
7	$160
8	$150
10	$138
13	$139
14	$145



a. Find the slope between 2005 and 2008 and explain its meaning in context in a complete sentence.

$\frac{188-150}{5-8} = \frac{38}{-3} \approx 12.\overline{6} \approx \$12.7$

Between 2005 and 2008 the average home value went down by about 12.7 thousand dollars per year. ($12,700)

b. Find the slope between 2013 and 2014 and explain its meaning in context in a complete sentence.

$\frac{145-139}{14-13} = \frac{6}{1} = 6$

Between 2013 and 2014 the average home value went up by 6 thousand dollars ($6,000)

c. Use regression to find a quadratic equation to model the data. Round the numbers in your equation to 2 decimal places.

$a = 1.30963541$
$b = -29.67057292$
$c = 303.5854167$

$y = ax^2 + bx + c$

$y = 1.31x^2 - 29.67x + 303.59$

d. Use your equation to predict the average home value in 2018.

$2018 - 2000 = 18$, $x = 18$

$y = 1.31(18)^2 - 29.67(18) + 303.59$
$y = \$193.97$

In 2018 the average home value will be $193.97 thousand ($193,970)

e. Use your equation to predict the year the average value will reach $180,000 again.

$180 = 1.31x^2 - 29.67x + 303.59$
$-180 \quad -180$
$1.31x^2 - 29.67x + 123.59 = 0$

$y = 180$

$x = \frac{-(-29.67) \pm \sqrt{(-29.67)^2 - 4(1.31)(123.59)}}{2 \cdot 1.31}$

$x = \frac{29.67 \pm \sqrt{232.69473}}{2.62}$

$x = 17.15$ and $x = 5.5$

The average home value will reach 180,000 in 2017 and 2005

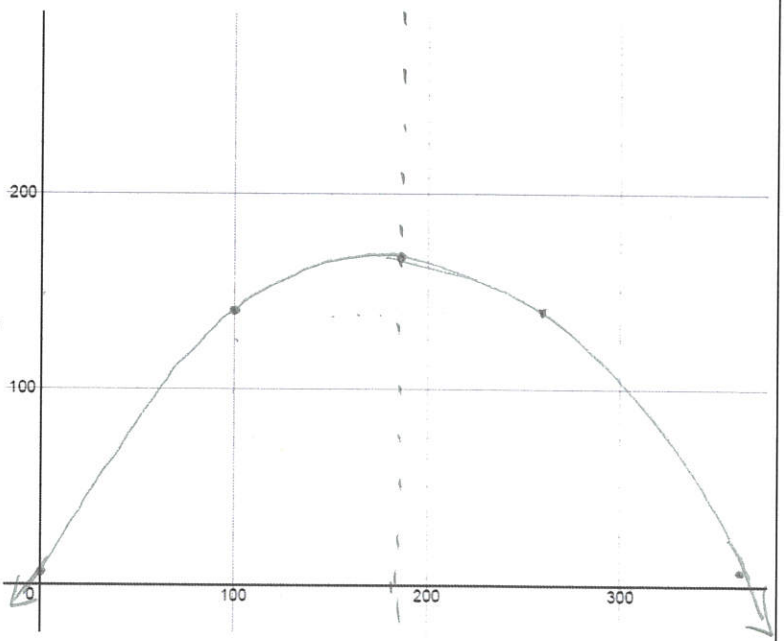
f. Use the vertex formula ($x = \frac{-b}{2a}$) to find the minimum home value and the year it occurred.

$x = \frac{-b}{2a} = \frac{-(-29.67)}{2(1.31)} = \frac{29.67}{2.62} \approx 11.32442748$ (2011)

$y = 1.31(11.32442748)^2 - 29.67(11.32442748) + 303.59 \approx 135.5921183$ ($135,592)

The minimum home value will be about $135,592 and will occur in 2011.

2. Consider the path of a baseball modeled by the function: $h = -.005x^2 + 1.8x + 5$; Where x is the horizontal distance in feet and h is the height in feet.



a. Graph the flight of the ball by finding some ordered pairs.

$x = \frac{-b}{2a} = \frac{-1.8}{2(-0.005)} = \frac{-1.8}{-0.01} = 180$

$y = -0.005(180)^2 + 1.8(180) + 5 = 167$

$(0, c) = (0, 5)$

$y = -0.005(100) + 1.8(100) + 5$

$y = 135$

x	y
180	167
0	5
100	135

b. If there is a 30 foot tall fence, 350 feet from home plate, will this be a home run?

at $x = 350$ is $h > 30$

$h = -0.005(350)^2 + 1.8(350) + 5$

$h = 22.5$ ft Not a home run since it does not go over the fence.

c. Find the maximum height the ball reaches using the vertex formula ($x = \frac{-b}{2a}$) ... verify on the graph.

$x = \frac{-b}{2a} = \frac{-1.8}{2(-0.005)} = \frac{-1.8}{-0.01} = 180$

$h = -0.005(180)^2 + 1.8(180) + 5$

$h = 167$ ft

(180, 167)

At 180 ft the ball reaches it's maximum height

d. Find the y-intercept and explain its meaning in context.

(0, c) (0, 5)

distance ↖ height

At the start (when the ball is first hit) the height is 5 ft above the ground.

e. Calculate the x-intercept and explain its meaning in context.

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1.8 \pm \sqrt{(1.8)^2 - 4(0.005)(5)}}{2(-0.005)}$

$x = \frac{-1.8 \pm \sqrt{3.34}}{-0.01}$

can't have negative distance

$x = 362.7566688$ or $x = -2.7566688$

The ball traveled about 363 ft before hitting the ground.