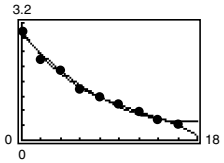
Polynomial and Rational Functions Answers

1. a. $y = 0.0082x^2 - 0.280x + 2.89$;
$y = -0.00067x^3 + 0.0242x^2 - 0.377x + 2.98$



Sample answer: Both models fit the data well, but the curve of the cubic model follows some of the data points more closely than that of the quadratic model.

b. The minimum value $y \approx 0.500$ occurs at $x \approx 17.073$; no; yes; Because the minimum value of the function is greater than 0, so is the rest of the graph. So, the function has no real zero; Because the polynomial function is of degree 2 and has no real zero, it must have 2 complex zeros.

c. no; The candle keeps getting shorter, but the value of the quadratic function begins to increase to the right of the minimum value at $x \approx 17.073$.

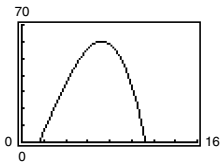
d. The graph eventually increases to the left and decreases to the right.

e. From part (d), you know that the polynomial function has a y-value much greater than 0 and a y-value much less than 0. By the Intermediate Theorem, then, the function takes on every value in between these two values, including 0.

2. a. $0 < x < 6$

b. $x(12 - 2x)(15 - 2x) \geq 150$; All real values of x in the approximate open interval $(1.275, 3.293)$

3. a.



$39,083, $100,000

b. Use synthetic division to divide the polynomial by each amount, and the remainder should be about 34;

$$\begin{array}{r|rrrr} 10 & -0.2 & 1.4 & 11.4 & -20 \\ & & -2.0 & -6.0 & 54 \\ \hline & -0.2 & -0.6 & 5.4 & 34 \end{array} \rightarrow P(10) = 34$$

4. a. $A = \dfrac{(x + 2)(88 + 4x)}{x}$; $(0, \infty)$; Answers will vary.

b. Vertical asymptote: $x = 0$; slant asymptote: $y = 4x + 96$

c. about 8.633 inches wide and 17.267 inches tall