Honors Algebra 2   Chapter 5 Review   Fall 2016
Round decimals to the nearest hundredth unless noted otherwise. Give imaginary answers in standard form and with simplified radicals.

1. A company wants to minimize its costs. The following equation represents the company costs $C(e)$, in thousands of dollars, as a function of the number of employees e. $C(e) = 3e^2 - 96e + 870$.
a) Find the number of employees that minimize the company's costs
b) What are the minimum costs.
c) How many employees will create a cost of zero?

2. An object is shot into the air from the top of a 50 foot building. The following equation models the objects height $h(t)$ as a function of the amount of time t (sec) after the launch. $h(t) = -16t^2 + 144t + 50$
  a) Find the objects maximum height and the time it takes to reach that height.
  b) Find the amount of time it takes the object to come back down to the ground.
  c) Find the amount of time it takes the object to reach a height of 75 feet.

3. A small theater normally sells 300 tickets for $12 each. After taking a survey they found out that for every $1.50 increase in ticket price they would lose 15 customers. Find the price they theater should charge in order to maximize their income.
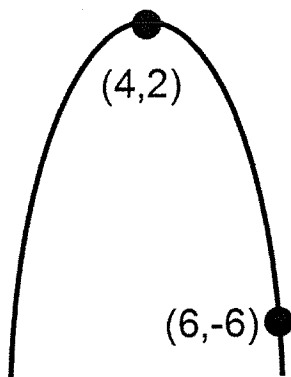
Use these quadratic functions for problems 4 and 5:
A $y = -33x^2 - 4x + 60$ B $y = 0.0042x^2 + 8x - 57$ C $y = -x^2 + 2x - 12$
4. Does each parabola open up or down?
5. Is each vertex a maximum or a minimum?

8. Write the equation of the parabola shown below in Vertex Form.

7.   For each quadratic find the equation for the LOS, the coordinates of the Vertex, and the y-intercept.
a) $y = 4x^2 + 16x - 9$ b) $y = 5x^2 + 3$ c) $y = -2x^2 + 12x$ d) $y = -4(x + 8)^2 - 9$

8. The table below shows the horizontal distance (in feet) traveled by a baseball hit at various angles

Angle (degrees)	10	15	20	30	40	45	50	60
Distance (feet)	115.6	157.2	189.2	253.8	284.8	285	269.2	231.4

a) You should be able to make a scatter plot on the graphing calculator then sketch the scatter plot.
b) Find either a linear or quadratic regression equation to model the data. Use the equation that seems to be a better fit for the data. Round to the nearest hundredth.
c) Find the distance a ball will travel if it is hit at a $80°$ angle. Round to the nearest tenth.

Factor each completely.

9. $12x^5 + 16x^3$ 10. $x^2 - 100$ 11. $80y^8 - 405$

12. $5m^3 - 45m$ 13. $2x^4 + 26x^3 + 60x^2$ 14. $x^2 - 5x - 36$

15. $x^2 - 10x + 16$ 16. $2x^2 + 16x - 96$ 17. $21x^2 + 69x + 18$

18. $4x^2 - 15x + 14$

Solve by factoring.
19. a) $x^2 - 2x = 24$ b) $8x^2 + 12 = -28x$ c) $4x^2 - x - 6 = x + 19 - 2x$

20. (a) $4x^2 + 10x = 0$ (b) $3x^2 + 24x + 36 = 0$

21. $6x^2 - 25x - 9 = 0$

Find the EXACT solutions, real and imaginary, to each by using square roots. Give answers in simplified radical form.
22. $5x^2 - 14 = 146$ 23. $2x^2 + 103 = 59$ 24. $(x - 2)^2 + 3 = -13$

For 25-27, find all solutions, real and imaginary, by using the quadratic formula: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Give real answers rounded to the nearest hundredth. Give imaginary answers in simplified radical form.

25. $x^2 - 6x - 10 = 0$ 26. $4x^2 - 20x + 25 = 0$ 27. $x^2 - 4x + 13 = 0$

Simplify each.
28. a) $(4 + 7i) + (6 - \sqrt{-64})$ b) $(-4 - \sqrt{-12}) - (8 + \sqrt{-75})$

29. $2i(8 - 4i)$ 30. $(4 - 5i)(2 - 3i)$ 31. $(7 - 3i)(7 + 3i)$

32. Fill in the blanks to show the missing values that Complete the Square
a) $x^2 + 16x$_____ $= ($_____$)^2$ b) $x^2 - 24x$_____ $= ($_____$)^2$

c) $x^2 + 7x$_____ $= ($_____$)^2$

33. Find the EXACT solutions, real and imaginary, to each by completing the square. Give answers in simplified radical form.
a) $x^2 + 6x = 3$ b) $2x^2 - 16x + 82 = 0$

1. a) # employees to min costs = 16. b) Minimum costs = 102 (which means $102,000)

c) If the costs are zero the Discriminant is negative, therefore, this will NOT happen. Unless of course they go out of business!

2. a). Max height of 374 feet after 4.5 sec   b). The object will hit the ground after 9.33 sec

c). The object will be 75 high two times, after 0.18 sec and 8.82 sec.

3. $Income$ = (# tickets)($ per ticket)$(300 - 15x)(12 + 1.50x) = -22.5x^2 + 270x + 3600$ x =# of $1.50 increases

LOS: $x = \dfrac{-270}{2(-22.5)} = 6$ 6 ticket price increases of $1.50 each = $\boxed{\text{Best Ticket Price of \$21}}$

4. A: Down   B: Up   C: Down   5. A: Max   B: Min   C: Max

6. $y = -2(x-4)^2 + 2$

7. For each quadratic find the equation for the LOS, the coordinates of the Vertex, and the y-intercept.

a) $y = 4x^2 + 16x - 9$ b) $y = 5x^2 + 3$ c) $y = -2x^2 + 12x$ d) $y = -4(x+8)^2 - 9$

a) LOS: $x = -2$, Vertex$(-2,-25)$, $y - int = -9$

b) LOS: $x = 0$, Vertex$(0,3)$, $y - int = 3$

c) LOS: $x = 3$, Vertex$(3,18)$, $y - int = 0$

d) LOS: $x = -8$, Vertex$(-8,-9)$, $y - int = -265$

8. a) Scatter plot looks like a parabola.   b) EQ: $y = -0.16x^2 + 13.64x - 10.61$ c) 56.6 feet.

9. $4x^3(3x^2 + 4)$ 10. $(x \pm 10)$ 11. $5(2y^2 \pm 3)(4y^4 + 9)$ 12. $5m(m \pm 3)$

13. $2x^2(x + 10)(x + 3)$ 14. $(x + 4)(x - 9)$ 15. $(x - 2)(x - 8)$

16. $2(x + 12)(x - 4)$ 17. $3(7x + 2)(x + 3)$ 18. $(4x - 7)(x - 2)$

19. a) $x = -4, 6$ b) $x = -\frac{1}{2}, -3$ c) $x = \pm\frac{5}{2}$

20. (a) $x = 0, -\frac{5}{2}$ (b) $x = -2, -6$ 21. $x = -\frac{1}{3}, \frac{9}{2}$

22. $x = \pm 4\sqrt{2}$ 23. $x = \pm i\sqrt{22}$ 24. $x = 2 \pm 4i$

25. $x = -1.36, 7.36$ 26. $x = \frac{5}{2}$ 27. $x = 2 \pm 3i$

28. a) $10 - i$ b) $-12 - 7i\sqrt{3}$ 29. $8 + 16i$ 30. $-7 - 22i$ 31. 58

32. a) $x^2 + 16x + 64 = (x + 8)^2$ b) $x^2 - 24x + 144 = (x - 12)^2$

c) $x^2 + 7x + \frac{49}{4} = (x + \frac{7}{2})^2$

33. a) $x = -3 \pm 2\sqrt{3}$ b) $x = 4 \pm 5i$