# Chapter 11 Review

**In problems 1-7, solve the given equation.  Give exact answers.**

1.  $36x^2 - 5 = 0$
2.  $2(x-6)^2 - 6 = 0$
3.  $4x(x-2) - 3x(x+1) = -18$

4.  $x^2 + 2x + 3 = 0$
5.  $2x + 5 = x^2$
6.  $x^2 - 4x + 8 = 0$

7.  $6(x^2 + x) - 2x(9x + 3) = 10$

**In problems 8-9, write a quadratic equation with the given solutions.  Write your answer in standard form $ax^2 + bx + c = 0$.**

8.  $x = 0,\ x = 7$
9.  $x = 9i,\ x = -9i$

**In problems 10-11, complete the square by filling in the blanks.**

10.  $x^2 + 12x + \underline{\qquad} = (x + \underline{\qquad})^2$
11.  $x^2 - 5x + \underline{\qquad} = (x - \underline{\qquad})^2$

**In problems 12-14, sketch the function and give its vertex, axis of symmetry, domain, and range.**

12. $f(x) = -3(x+2)^2 + 4$

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

14. $y = -2x^2 + 9x - 13$

**In problems 15-16, find the x-intercepts and y-intercept of the functions.  Write your answers as ordered pairs, and give exact answers.**

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

16. $y = -2x^2 + 9x - 13$

**In problems 17-18, solve for the specified variable.**

17. $V = \frac{1}{3}\pi\left(R^2 + r^2\right)$ for $r$

18. $2A + T = 3T^2$ for $T$

19. The NBA's LeBron James reportedly has a vertical leap of 44 inches.  What is his hang time?  Use $V = 48T^2$.

20. The number of pounds of milk per day recommended for a calf that is *x* weeks old can be approximated by the function $p(x) = -0.2x^2 + 1.3x + 6.2$. When is a calf's milk consumption greatest and how much milk does it consume at that time?

21. A publisher is trying to minimize its average cost per book printed. This average cost in dollars is given by $f(x) = 0.015x^2 - 0.07x + 26$, where x represents the total number of books (in thousands) printed. What is the minimum cost per book, and how many books should they print to minimize the average cost?

22. Ginger is fencing in a rectangular garden, using the side of her house as one side of the rectangle. What is the maximum area that she can enclose with 40 yards of fencing? What should the dimensions of the garden be in order to yield this area?

23. The number of McDonalds restaurants for various years is listed in the following table:

   a. Use the regression feature on your calculator to find a quadratic function to fit the data. (Let x = # years after 1948) Is the function a good fit?
   b. Use the function to estimate the number of McDonalds restaurants there will be in the year 2020.

| Year | Number of Restaurants |
|------|----------------------|
| 1948 | 1 |
| 1956 | 14 |
| 1960 | 228 |
| 1968 | 1,000 |
| 1970 | 1,600 |
| 1975 | 3,076 |
| 1980 | 6,263 |
| 1984 | 8,300 |
| 1990 | 11,800 |
| 2008 | 32,000 |

Answers

1. $x = \pm \dfrac{\sqrt{5}}{6}$  2. $x = 6 \pm \sqrt{3}$  3. $x = 2, 9$

4. $x = -1 \pm \sqrt{2}\, i$  5. $1 \pm \sqrt{6}$  6. $2 \pm 2i$

7. $\pm \dfrac{\sqrt{30}}{6} i$

8. $x^2 - 7x = 0$  9. $x^2 + 81$

10. $x^2 + 12x + 36 = (x+6)^2$  11. $x^2 - 5x + \dfrac{25}{4} = \left( x - \dfrac{5}{2} \right)^2$

12. vertex (-2,4), axis of symmetry x=-2, domain $(-\infty, \infty)$, range $(-\infty, 4]$

13. vertex (-1,-8), axis of symmetry x=-1, domain $(-\infty, \infty)$, range $[-8, \infty)$

14. vertex $\left( \dfrac{9}{4}, -\dfrac{23}{8} \right)$, axis of symmetry x=9/4, domain $(-\infty, \infty)$, range $(-\infty, -23/8]$

15. x-intercepts (-3,0), (1,0), y-intercept (0,-6)

16. no x-intercepts, y-intercept (0,-13)

17. $r = \sqrt{\dfrac{3V}{\pi} - R^2}$  18. $T = \dfrac{1 \pm \sqrt{1 + 24A}}{6}$

19. 0.957 seconds

20. At 3.25 weeks old, the calf needs 8.3125 pounds of milk.

21. When they print 2.333 thousand books (or 2,333 books), the average cost per book is $25.92.

22. The width should be 10 yards, the length should be 20 yards, and the maximum area is 200 square yards.

23. a.  $y = 12.62x^2 - 242.26x + 706.65$  It is a good fit because $R^2 = .997$, close to 1.

    b.  In 2020, there will be approximately 48,690 McDonalds restaurants.