HW: Pages 343-345: 5, 10; Pages 349-351(ch. review): 35-53 odd

Pages 343-345:

5. Economics and Marketing The following data represent the price and quantity demanded in 2009 for Dell personal computers.

Price ($/Computer)	Quantity Demanded
2300	152
2000	159
1700	164
1500	171
1300	176
1200	180
1000	189

(a) Using a graphing utility, draw a scatter diagram of the data with price as the dependent variable.
(b) Using a graphing utility, build a logarithmic model from the data.
(c) Using a graphing utility, draw the logarithmic function found in part (b) on the scatter diagram.
(d) Use the function found in part (b) to predict the number of Dell personal computers that will be demanded if the price is $1650.

10. Cable Subscribers The following data represent the number of basic cable TV subscribers in the United States. A market researcher believes that external factors, such as satellite TV, have affected the growth of cable subscribers. She is interested in building a model that can be used to describe the number of cable TV subscribers in the United States.

(a) Using a graphing utility, draw a scatter diagram of the data using the number of years after 1970, t, as the independent variable and number of subscribers as the dependent variable.
(b) Using a graphing utility, build a logistic model from the data.
(c) Using a graphing utility, draw the function found in part (b) on the scatter diagram.
(d) Based on the model found in part (b), what is the maximum number of cable TV subscribers in the United States?
(e) Use the model found in part (b) to predict the number of cable TV subscribers in the United States in 2015.

Year	Subscribers (1,000)
1975 ($t = 5$)	9,800
1980 ($t = 10$)	17,500
1985 ($t = 15$)	35,440
1990 ($t = 20$)	50,520
1992 ($t = 22$)	54,300
1994 ($t = 24$)	58,373
1996 ($t = 26$)	62,300
1998 ($t = 28$)	64,650
2000 ($t = 30$)	66,054
2002 ($t = 32$)	64,556
2004 ($t = 34$)	65,263
2006 ($t = 36$)	64,908
2007 ($t = 37$)	65,913
2008 ($t = 38$)	66,218

Source: Statistical Abstract of the United States, 2011

Pages 349-351:

In Problems 35–45, solve each equation. Express irrational solutions in exact form and as a decimal rounded to 3 decimal places. Verify your results using a graphing utility.

35. $8^{6+3x} = 4$

36. $3^{x^2+x} = \sqrt{3}$

37. $\log_x 64 = -3$

38. $5^x = 3^{x+2}$

39. $25^{2x} = 5^{x^2-12}$

40. $\log_3 \sqrt{x-2} = 2$

41. $8 = 4^{x^2} \cdot 2^{5x}$

42. $2^x \cdot 5 = 10^x$

43. $\log_6(x+3) + \log_6(x+4) = 1$

44. $e^{1-x} = 5$

45. $9^x + 4 \cdot 3^x - 3 = 0$

46. Suppose that $f(x) = \log_2(x-2) + 1$.
(a) Graph f.
(b) What is $f(6)$? What point is on the graph of f?
(c) Solve $f(x) = 4$. What point is on the graph of f?
(d) Based on the graph drawn in part (a), solve $f(x) > 0$.
(e) Find $f^{-1}(x)$. Graph f^{-1} on the same Cartesian plane as f.

47. Amplifying Sound An amplifier's power output P (in watts) is related to its decibel voltage gain d by the formula
$$P = 25e^{0.1d}$$

(a) Find the power output for a decibel voltage gain of 4 decibels.
(b) For a power output of 50 watts, what is the decibel voltage gain?

48. Limiting Magnitude of a Telescope A telescope is limited in its usefulness by the brightness of the star that it is aimed at and by the diameter of its lens. One measure of a star's brightness is its *magnitude;* the dimmer the star, the larger its magnitude. A formula for the limiting magnitude L of a

49. Salvage Value The number of years n for a piece of machinery to depreciate to a known salvage value can be found using the formula
$$n = \frac{\log s - \log i}{\log(1-d)}$$
where s is the salvage value of the machinery, i is its initial value, and d is the annual rate of depreciation.

(a) How many years will it take for a piece of machinery to decline in value from $90,000 to $10,000 if the annual rate of depreciation is 0.20 (20%)?
(b) How many years will it take for a piece of machinery to lose half of its value if the annual rate of depreciation is 15%?

51. Funding a College Education A child's grandparents wish to purchase a bond that matures in 18 years to be used for her college education. The bond pays 4% interest compounded semiannually. How much should they pay so that the bond will be worth $85,000 at maturity?

53. Temperature of a Skillet A skillet is removed from an oven whose temperature is 450°F and placed in a room whose temperature is 70°F. After 5 minutes, the temperature of the skillet is 400°F. How long will it be until its temperature is 150°F?