

MAC 2233 chapter 2 Practice V1**True/False**

Indicate whether the statement is true or false.

_____ 1. True or False?

The given table corresponds to the function $f(x) = 5^x - 1$.

x	-3	-2	-1	0	1	2	3
$f(x)$	-0.992	-0.96	-0.8	0	4	24	124

_____ 2. True or False?

The given table corresponds to the function $f(x) = 0.042 \left(4.2 - \frac{5}{1.7} \right)^{-x}$.

x	-3	-2	-1	0	1	2	3
$f(x)$	0.084	0.067	0.067	1	0.033	0.027	0.021

_____ 3. True or False?

The table is filled correctly.

Exponential form	Logarithmic form
$8^{-3} = 0.001953$	$\log_8(0.001953) = 3$
$2^0 = 1$	$\log_2(1) = 0$
$0.4^4 = 0.0256$	$\log_{0.4}(0.0256) = 4$
$0.8^{-3} = 1.953125$	$\log_{0.8}(1.953125) = 3$

Multiple Choice

Identify the choice that best completes the statement or answers the question.

_____ 4. Find the vertex of the graph of the quadratic function.

$$-x^2 + 8x - 16$$

- a. (-4,4)
- b. (0,4)
- c. (-4,0)
- d. (-4,-4)
- e. (4,0)

- _____ 5. Find the y -intercept(s) of the graph of the quadratic function.

$$3x^2 - 42x + 147$$

- a. (0, 147)
- b. (0, -147)
- c. (147, 0)
- d. (7, 0), (7, 0)
- e. (0, 7), (0, 7)

- _____ 6. For the following demand equation, express the total revenue R as a function of the price p per item.

$$q = -3p + 1400$$

- a. $R = -3p^2 + 1400$
- b. $R = -3p^2$
- c. $R = 1397p$
- d. $R = -3p^2 + 1400p$
- e. $R = -3 + \frac{1400}{p}$

- _____ 7. For the following demand equation, find the largest possible revenue.

$$q = -2p + 1,000$$

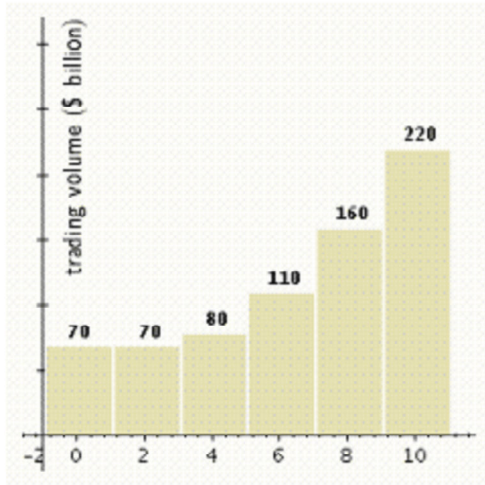
- a. 500
- b. 250,000
- c. 375,000
- d. 125,000
- e. 250

- _____ 8. For the following demand equation, find the largest possible revenue.

$$q = -2p + 2,000$$

- a. 500,000
- b. 1,000
- c. 400,000
- d. 1,000,000
- e. 500

- _____ 9. The following chart shows the value of trade between two countries for the period 1994-2004 ($t = 0$ represents 1994).



Which of the following models best approximates the data given? (Try to answer this without actually computing values.)

- a. $f(t) = 2t^2 - 5t - 80$
 b. $f(t) = -2t^2 + 5t - 80$
 c. $f(t) = 2t^2 - 5t + 70$
 d. $f(t) = -2t^2 - 5t - 70$
 e. $f(t) = -2t^2 - 5t + 70$
- _____ 10. The fuel efficiency (in miles per gallon) of a sport utility vehicle (SUV) depends on its weight according to the formula

$$E = 0.00003x^2 - 0.18x + 56$$

where x is the weight of an SUV in pounds. According to the model, what is the weight of the least fuel-efficient SUV?

- a. 6,000 pounds
 b. 3,000 pounds
 c. 3,100 pounds
 d. 2,000 pounds
 e. 326 pounds

- _____ 11. The market research department of the Better Baby Buggy Co. predicts that the demand equation for its buggies is given by $q = -0.4x + 190$ where q is the number of buggies it can sell in a month if the price is $\$x$ per buggy. What is the largest monthly revenue?
- \$3,610
 - \$190
 - \$95
 - \$38
 - \$7,220
- _____ 12. Pack-Em-In Real Estate is building a new housing development. The more houses it builds, the less people will be willing to pay, due to the crowding and smaller lot sizes. In fact, if the company builds 60 houses in this particular development, it can sell them for \$180,000 each, but if it builds 70 houses, it will be able to get only \$170,000 each. What is the largest possible revenue the company can get?
- \$12,000,000
 - \$14,400,000
 - \$14,156,000
 - \$432,000
 - \$14,526,000
- _____ 13. The two fraternities Sigma Alpha Mu and Ep Sig plan to raise money jointly to benefit homeless people on Long Island. They will sell Starship Troopers T-shirts in the Student Center, but they are not sure how much to charge. Sigma Alpha Mu treasurer Solo recalls that they once sold 200 shirts in a week at \$8 each, but Ep Sig treasurer Justino claims that, based on past experience, they can sell 500 per week if they charge \$4 each. The university administration charges the fraternities \$300 per week for use of the Student Center. What is the largest possible weekly profit, rounded to the nearest dollar?
- \$1,833
 - \$533
 - \$2,133
 - \$800
 - \$4,267
- _____ 14. You are the sales manager for Montevideo Productions, Inc., and you are planning to review the prices you charge clients for television advertisement development. You currently charge each client an hourly development fee of \$2,000. With this pricing structure, the demand, measured by the number of contracts Montevideo signs per month, is 25 contracts. This is down 10 contracts from the figure last year, when your company charged only \$1,000. Construct a linear demand equation giving the number of contracts q as a function of the hourly fee p Montevideo Productions, Inc., charges for development.
- $q(p) = -0.01p - 45$
 - $q(p) = 100p + 45$
 - $q(p) = -100p - 45$
 - $q(p) = -0.01p + 45$
 - $q(p) = 0.01p + 45$

Name: _____

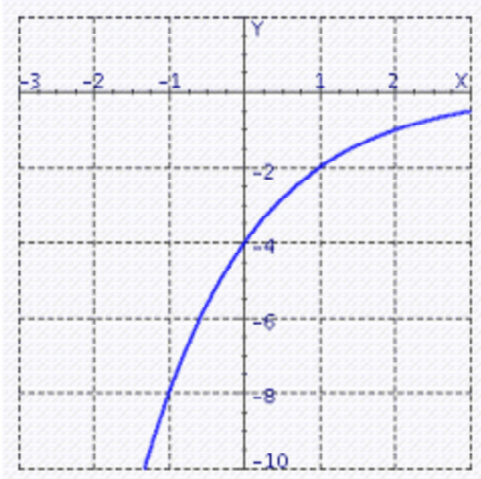
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15. Graph the function.

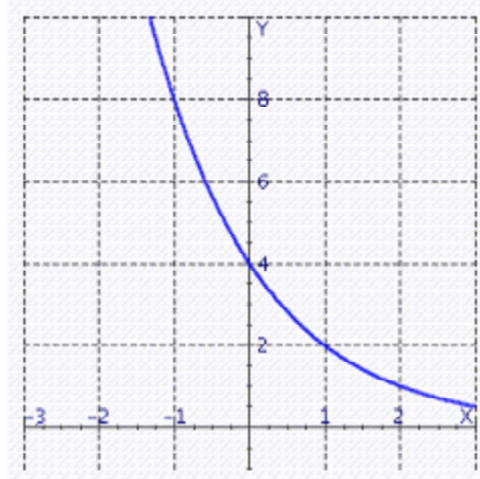
$$f(x) = 4(2^{-x})$$

Select the correct answer.

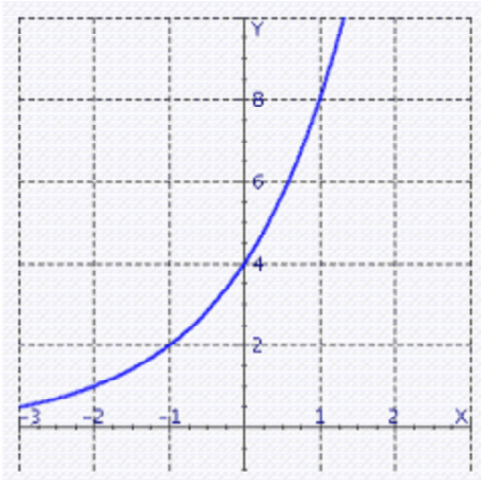
a.



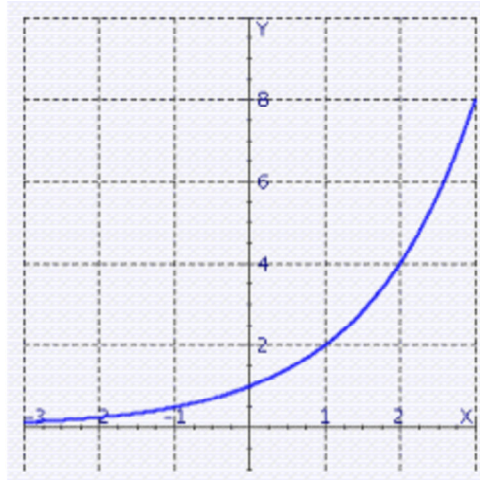
c.



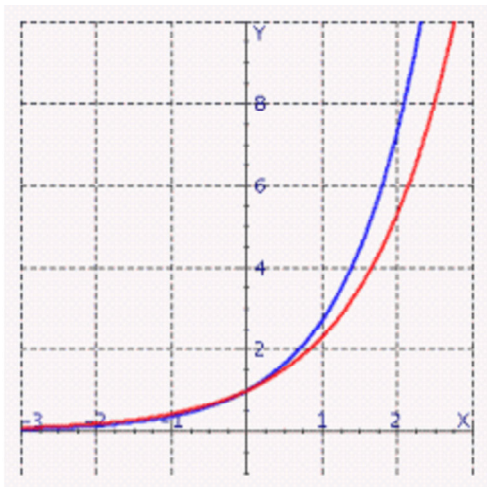
b.



d.



- _____ 16. Given the graph of the functions $f_1(x) = 2.3^x$ and $f_2(x) = 2.7^x$. Identify which graph corresponds to $f_2(x) = 2.7^x$.



Select the correct answer.

- a. Red
- b. Blue

- _____ 17. Model the data using an exponential function $f(x) = Ab^x$.

x	0	1	2
$f(x)$	20	80	320

Select the correct answer.

- a. $f(x) = 20(4)^x$
- b. $f(x) = 4(4)^x$
- c. $f(x) = 20(4)^{-x}$
- d. $f(x) = 4(20)^{-x}$
- e. $f(x) = 20(20)^x$

- _____ 18. Model the data using an exponential function $f(x) = Ab^x$.

x	1	2
$f(x)$	120	144

Select the correct answer.

- a. $f(x) = 1.2(100)^x$
 - b. $f(x) = 1.2(1.2)^{-x}$
 - c. $f(x) = 100(100)^x$
 - d. $f(x) = 100(1.2)^x$
 - e. $f(x) = 100(1.2)^{-x}$
- _____ 19. Soon after taking an aspirin, a patient has absorbed 330 mg of the drug. If the amount of aspirin in the bloodstream decays exponentially with half being removed every 3 hours, find the amount of aspirin in the bloodstream after 7 hours.

Select the correct answer.

- a. 654.8
 - b. 6548
 - c. 128.13
 - d. 25.42
 - e. 65.48
- _____ 20. The U.S. population was 180 million in 1965 and 240 million in 1995. Assuming exponential population growth, what will the population be in the year 2010?

Select the correct answer.

- a. 270 million
 - b. 539 million
 - c. 250 million
 - d. 277 million
 - e. 1,078 million
- _____ 21. Rock Solid Bank & Trust is offering a CD that pays 5% compounded continuously. How much interest would a \$5,000 deposit earn over 15 years? (Round your answer to the nearest dollar.)

Select the correct answer.

- a. \$5,585
- b. \$15,585
- c. \$10,395
- d. \$10,569
- e. \$10,585

Name: _____

ID: A

____ 22. Use logarithms to solve the equation. (Round answers to four decimal places.)

$$6^{-2x} = 40$$

- a. $x = 1.0294$
- b. $x = 0.8333$
- c. $x = -1.8493$
- d. $x = -0.8333$
- e. $x = -1.0294$

____ 23. Use logarithms to solve the equation. (Round answers to four decimal places.)

$$8\left(2.5^{2x-1}\right) = 10$$

- a. $x = 0.6218$
- b. $x = -0.6218$
- c. $x = 1.2436$
- d. $x = 0.25$
- e. $x = -1.2436$

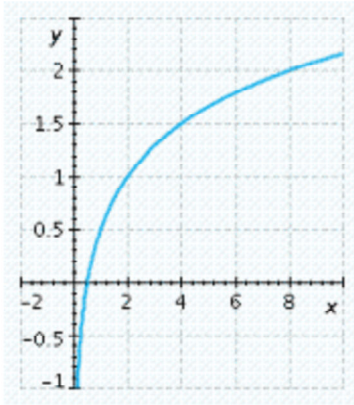
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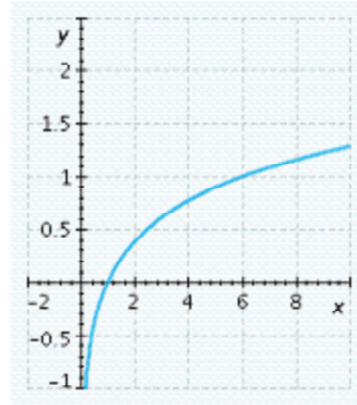
___ 24. Graph the function.

$$f(x) = \log_4 x$$

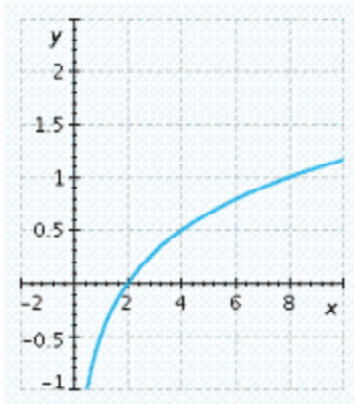
a.



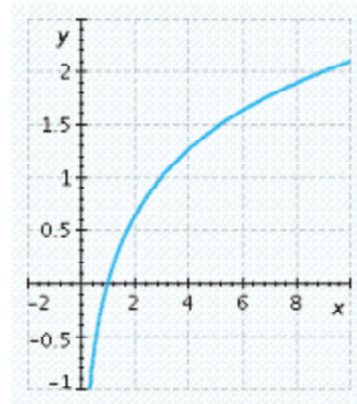
d.



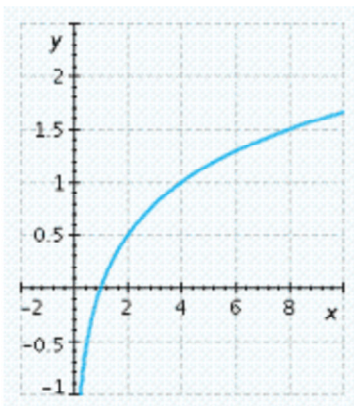
b.



e.



c.



_____ 25. Find the associated exponential decay model.

$$Q = 6000 \text{ when } t = 0; \text{ Half-life} = 9$$

- a. $Q = 6000e^{-t/9}$
- b. $Q = 6000 + e^{t(\ln 2)/9}$
- c. $Q = 6000e^{-t(\ln 2)/9}$
- d. $Q = 6000 - e^{t/9}$
- e. $Q = 6000e^{t/9}$

_____ 26. Find the associated doubling time.

$$Q = 1,000e^{0.5t}$$

- a. $\ln 2$
- b. $2 \ln 2$
- c. $\frac{0.5}{\ln 2}$
- d. $\frac{2}{\ln 2}$
- e. $0.5 \ln 2$

_____ 27. Convert the exponential function to the form indicated. Round all coefficients to four significant digits.

$$f(x) = 2.4e^{-0.5x}; f(x) = Ab^x$$

- a. $A = 2.4, b = 0.6067$
- b. $A = 2.4, b = 0.6065$
- c. $A = 1.4, b = 0.7299$
- d. $A = 1.4, b = 0.6035$
- e. $A = 5.4, b = 0.472$

_____ 28. Convert the exponential function to the form indicated. Round all coefficients to four significant digits.

$$f(t) = 23.1(0.995)^t; f(t) = Q_0e^{-kt}$$

- a. $Q_0 = 23.1, k = 0.003549$
- b. $Q_0 = 23, k = 0.009405$
- c. $Q_0 = 23.1, k = 0.005013$
- d. $Q_0 = 23, k = 0.007941$
- e. $Q_0 = 23.1, k = 0.006477$

____ 29. How long will it take an investment to triple if it is continuously compounded at 15% per year?

Select the correct answer rounded to the nearest year.

- a. 4 years
- b. 13 years
- c. 7 years
- d. 15 years
- e. 8 years

____ 30. The amount of carbon-14 remaining in a sample that weighs A is given by $N(t)=A(0.999879)^t$ where t is time in years. If tests on a fossilized skull reveal that 99.97% of the carbon-14 has decayed, how old is the skull?

Select the correct answer rounded to the nearest integer.

- a. 2,629 years old
- b. 23,234 years old
- c. 0 years old
- d. 1,985 years old
- e. 28,978 years old

____ 31. How long, to the nearest year, will it take an investment in Japan to double its value if the interest is compounded every six months? Please round the answer to the nearest year.

Country	U.S.	Japan	Canada	Korea	Australia
Yield	5.3%	1.5%	5.2%	5.4%	6.0%

- a. 47 years
- b. 46 years
- c. 42 years
- d. 51 years
- e. 43 years

____ 32. Plutonium-239 is used as a fuel for some nuclear reactors and also as the fissionable material in atomic bombs. It has a half-life of 24,400 years. How long will it take 14 grams of plutonium-239 to decay to 1 grams?

Select the correct answer rounded to the nearest integer.

- a. 23,250 years
- b. 93,000 years
- c. 92,900 years
- d. 185,800 years
- e. 46,500 years

- _____ 33. Soon after taking an aspirin, a patient has absorbed 350 mg of the drug. If the amount of aspirin in the bloodstream decays exponentially, with half being removed every 2 hours, find the time it will take for the amount of aspirin in the bloodstream to decrease to 290 mg.

Select the answer rounded to three decimal places.

- a. 1.843 hours
 - b. 5.529 hours
 - c. 0.921 hours
 - d. 4.607 hours
 - e. 3.686 hours
- _____ 34. You are trying to determine the half-life of a new radioactive element you have isolated. You start with 3 grams, and 4 days later you determine that it has decayed down to 0.1 gram. What is the half-life? Round your answer to three decimal places.

Select the answer rounded to three decimal places.

- a. 0.815 days
 - b. 1.630 days
 - c. 0.408 days
 - d. 2.446 days
 - e. 1.223 days
- _____ 35. Find N , A , and b for the function given.

$$f(x) = \frac{4}{0.5 + 5.5(1.5^{-x})}$$

- a. $N = 1.5, A = 11, b = 8$
- b. $N = 8, A = 1.5, b = 11$
- c. $N = 8, A = 11, b = 1.5$
- d. $N = 11, A = 1.5, b = 8$
- e. $N = 11, A = 8, b = 1.5$

_____ 36. Find the logistic function f with the given properties. $f(0) = 5$, f has limiting value 20, and for small values of x , f is approximately exponential and grows by 50% with every increase of 1 in x .

a. $f(x) = \frac{20}{1 + 1.5^{-x}}$

b. $f(x) = \frac{20}{1 + 3(2^{-x})}$

c. $f(x) = \frac{20}{1 + 3(1.5^{-x})}$

d. $f(x) = \frac{1}{1 + 1.5^{-x}}$

e. $f(x) = \frac{20}{1 + 2^{-x}}$

_____ 37. Find the logistic function f with the given properties. f has limiting value 8 and passes through $(0, 2)$ and $(1, 6)$.

a. $f(x) = \frac{8}{1 + 3(9^{-x})}$

b. $f(x) = \frac{2}{1 + 3(9^{-x})}$

c. $f(x) = \frac{8}{1 + 4(18^{-x})}$

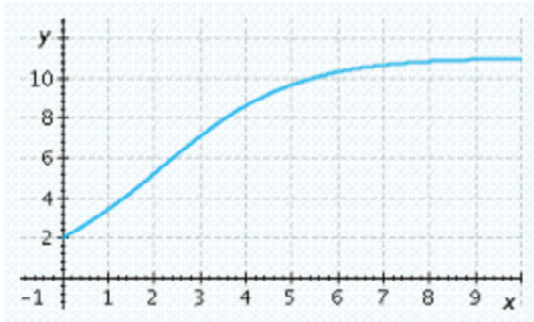
d. $f(x) = \frac{8}{1 + 3(18^{-x})}$

e. $f(x) = \frac{2}{1 + 3(18^{-x})}$

Name: _____

ID: A

___ 38. Choose the logistic function that best approximates the given curve.



a. $f(x) = \frac{6}{1 + 0.5(2^{-x})}$

b. $f(x) = \frac{11}{1 + 4.5(2^{-x})}$

c. $f(x) = \frac{6}{1 + 4.5(3^{-x})}$

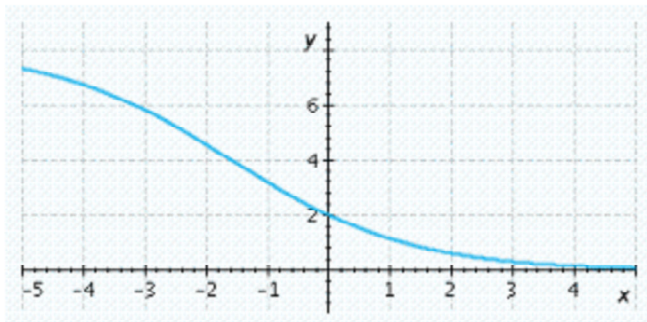
d. $f(x) = \frac{11}{1 + 0.5(1.01^{-x})}$

e. $f(x) = \frac{6}{1 + 0.5(3^{-x})}$

Name: _____

ID: A

___ 39. Choose the logistic function that best approximates the given curve.



a. $f(x) = \frac{8}{1 + 3(5^{-x})}$

b. $f(x) = \frac{8}{1 + 7(0.5^{-x})}$

c. $f(x) = \frac{8}{1 + 6(0.5^{-x})}$

d. $f(x) = \frac{8}{1 + 7(5^{-x})}$

e. $f(x) = \frac{8}{1 + 3(0.5^{-x})}$

- _____ 40. Use technology to find a logistic regression curve $y = \frac{N}{1 + Ab^{-x}}$ approximating the given data. (Round b to three significant digits and A and N to two significant digits.)

x	0	20	40	60	80	100
y	2.1	3.6	5.0	6.1	6.8	6.9

a. $y = \frac{7.2}{1 + 2.4(1.04^{-x})}$

b. $y = \frac{5.2}{1 + 7.2(2.08^{-x})}$

c. $y = \frac{7.2}{1 + 7.2(1.04^{-x})}$

d. $y = \frac{5.2}{1 + 2.4(1.04^{-x})}$

e. $y = \frac{7.2}{1 + 2.4(2.08^{-x})}$

- _____ 41. There are currently 1,000 cases of Venusian flu in a total susceptible population of 10,000 and the number of cases is increasing by 23% each day. Find a logistic model for the number of cases of Venusian flu and use your model to predict the number of flu cases a week from now. Round your answer to the nearest integer.

- a. $F(7) = 3,212$ cases
 b. $F(7) = 4,818$ cases
 c. $F(7) = 5,460$ cases
 d. $F(7) = 1,606$ cases
 e. $F(7) = 1,071$ cases

- _____ 42. In Russia the average consumer drank two servings of Coca-Cola in 1993. This amount appeared to be increasing exponentially with a doubling time of 2 years. Given a long-range market saturation estimate of 100 servings per year, find a logistic model for the consumption of Coca-Cola in Russia and use your model to predict when, to the nearest year, the average consumption will be 41 servings per year.

- a. Sometime in 1993.
 b. Sometime in 2003.
 c. Sometime in 2004.
 d. Sometime in 2005.
 e. Sometime in 2003.

Numeric Response

43. For the following demand equation, find the largest possible revenue.

$$q = -3p + 2,400$$

\$ _____

44. The U.S. population was 180 million in 1960 and 240 million in 1990. Assuming exponential population growth, what will the population be in the year 2020?

Round your answer to the nearest million.

_____ million

45. Use logarithms to solve the equation. (Round answers to four decimal places.)

$$6\left(6.5^{3x-2}\right) = 10$$

$x =$ _____

46. How long, to the nearest year, will it take an investment to triple if it is continuously compounded at 20% per year?

Round the answers to the nearest year.

_____ years

47. The table lists interest rates on long-term investments (based on 10-year government bonds) in several countries in 2004-2005. Assuming that you invest \$13,000 in Japan, how long (to the nearest year) must you wait before your investment is worth \$19,000 if the interest is compounded annually?

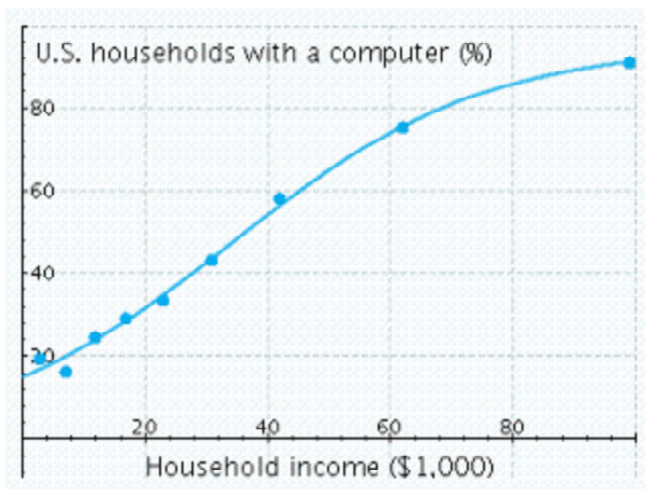
Country	U.S.	Japan	Canada
Yield	5.3%	1.5%	5.2%

_____ year(s)

48. The graph shows the actual percentage of U.S. households with a computer as a function of household income (the data points) and a logistic model of these data (the curve). The logistic model is

$$P(x) = \frac{95}{1 + 5.35(1.05)^{-x}}$$

where x is the household income in thousands of dollars. According to the model, what percentage of extremely wealthy households had computers?



$P =$ _____ %

**MAC 2233 chapter 2 Practice V1
Answer Section****TRUE/FALSE**

1. ANS: T PTS: 1
2. ANS: F PTS: 1
3. ANS: F PTS: 1

MULTIPLE CHOICE

4. ANS: E PTS: 1
5. ANS: A PTS: 1
6. ANS: D PTS: 1
7. ANS: D PTS: 1
8. ANS: A PTS: 1
9. ANS: C PTS: 1
10. ANS: B PTS: 1
11. ANS: A PTS: 1
12. ANS: B PTS: 1
13. ANS: A PTS: 1
14. ANS: D PTS: 1
15. ANS: C PTS: 1
16. ANS: B PTS: 1
17. ANS: A PTS: 1
18. ANS: D PTS: 1
19. ANS: E PTS: 1
20. ANS: D PTS: 1
21. ANS: A PTS: 1
22. ANS: E PTS: 1
23. ANS: A PTS: 1
24. ANS: C PTS: 1
25. ANS: C PTS: 1
26. ANS: B PTS: 1
27. ANS: B PTS: 1
28. ANS: C PTS: 1
29. ANS: C PTS: 1
30. ANS: E PTS: 1
31. ANS: B PTS: 1
32. ANS: C PTS: 1
33. ANS: A PTS: 1
34. ANS: A PTS: 1
35. ANS: C PTS: 1
36. ANS: C PTS: 1

- 37. ANS: A PTS: 1
- 38. ANS: B PTS: 1
- 39. ANS: E PTS: 1
- 40. ANS: A PTS: 1
- 41. ANS: A PTS: 1
- 42. ANS: E PTS: 1

NUMERIC RESPONSE

43. ANS: 480,000

PTS: 1

44. ANS: 320

PTS: 1

45. ANS: 0.7576

PTS: 1

46. ANS: 5

PTS: 1

47. ANS: 25

PTS: 1

48. ANS: 95

PTS: 1

A 5.

 C 9.

 A 11.

 C 15.

 T 1.

 D 6.

 B 12.

 F 2.

 A 13.

 F 3.

 D 7.

 B 10.

 A 8.

 D 14.

 E 4.

B 16.

D 18.

E 22.

C 24.

C 25.

A 23.

B 26.

E 19.

A 17.

B 27.

D 20.

C 28.

A 21.

C 29.

A 33.

C 36.

B 38.

E 39.

E 30.

A 34.

A 37.

B 31.

C 35.

C 32.

A 40.

A 41.

E 42.