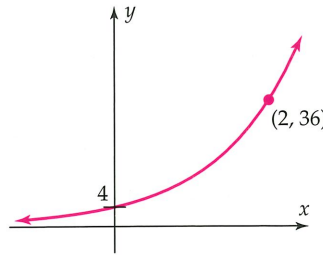
56. The figure is the graph of an exponential growth function $f(x) = Pa^x$.

(a) In this case, what is P? [*Hint:* What is $f(0)$?]

(b) Find the rule of the function f by finding a. [*Hint:* What is $f(2)$?]



57. Suppose you invest \$1200 in an account that pays 4% interest, compounded annually and paid from date of deposit to date of withdrawal.

(a) Find the rule of the function f that gives the amount you would receive if you closed the account after x years.

(b) How much would you receive after 3 years? After 5 years and 9 months?

(c) When should you close the account to receive \$1850?

58. Anne now has a balance of \$800 on her credit card, on which 1.5% interest per month is charged. Assume that she makes no further purchases or payments (and that the credit card company doesn't turn her account over to a bill collector).

(a) Find the rule of the function g that gives Anne's total credit card debt after x months.

(b) How much will Anne owe after one year? After two years?

(c) When will she owe twice the amount she owes now?

59. The population of Mexico was 100.4 million in 2000 and is expected to grow at the rate of 1.4% per year.

(a) Find the rule of the function f that gives Mexico's population (in millions) in year x, with $x = 0$ corresponding to 2000.

(b) Estimate Mexico's population in 2010.

(c) When will the population reach 125 million people?

60. The number of digital devices (such as MP3 players, handheld computers, cell phones, and PCs) in the world was approximately .94 billion in 1999 and is growing at a rate of 28.3% a year.*

(a) Find the rule of a function that gives the number of digital devices (in billions) in year x, with $x = 0$ corresponding to 1999.

(b) Approximately how many digital devices will be in use in 2004?

(c) If this model remains accurate, when will the number of digital devices reach 6 billion?

61. The U.S. Census Bureau estimates that the Hispanic population in the United States will increase from 32.44 million in 2000 to 98.23 million in 2050.†

(a) Find an exponential function that gives the Hispanic population in year x, with $x = 0$ corresponding to 2000.

(b) What is the projected Hispanic population in 2010 and 2025?

(c) In what year will the Hispanic population reach 55 million?

62. The U.S. Department of Commerce estimated that there were 54 million Internet users in the United States in 1999 and 85 million in 2002.

(a) Find an exponential function that models the number of Internet users in year x, with $x = 0$ corresponding to 1999.

(b) For how long is this model likely to remain accurate? [*Hint:* The current U.S. population is about 230 million.]

63. At the beginning of an experiment, a culture contains 200 *H. pylori* bacteria. An hour later there are 205 bacteria. Assuming that the *H. pylori* bacteria grow exponentially, how many will there be after 10 hours? After 2 days?

64. The population of India was approximately 1030 million in 2001 and was 865 million a decade earlier. If the population continues to grow exponentially at the same rate, what will it be in 2006?

65. Kerosene is passed through a pipe filled with clay to remove various pollutants. Each foot of pipe removes 25% of the pollutants.

(a) Write the rule of a function that gives the percentage of pollutants remaining in the kerosene after it has passed through x feet of pipe. [See Example 7.]

(b) How many feet of pipe are needed to ensure that 90% of the pollutants have been removed from the kerosene?

66. If inflation runs at a steady 3% per year, then the amount a dollar is worth decreases by 3% each year.

(a) Write the rule of a function that gives the value of a dollar in year x.

(b) How much will the dollar be worth in 5 years? In 10 years?

(c) How many years will it take before today's dollar is worth only a dime?

67. You have 5 grams of carbon-14, whose half-life is 5730 years.

(a) Write the rule of the function that gives the amount of carbon-14 remaining after x years. [See the box preceding Example 8.]

(b) How much carbon-14 will be left after 4000 years? After 8000 years?

(c) When will there be just 1 gram left?

*Based on data and projections from IDC.

†*Statistical Abstract of the United States: 2001.*