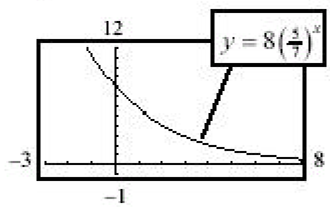
Assignment #1

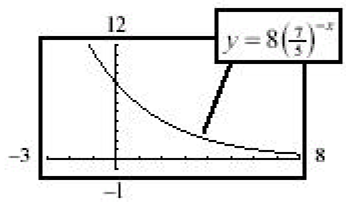
HW # 1 5.1 p 388 # 20, 22, 28, 32, 36, 46, 48, 50

20. a. $y = 8\left(\frac{5}{7}\right)^x = 8\left(\frac{7}{5}\right)^{-x}$

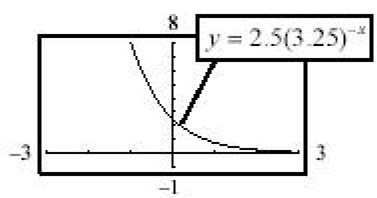
b. These functions are decay exponentials. They are algebraically equivalent and an exponential decay function is one of the form $f(x) = cb^{-x}$ where $b > 1$. In this form $b = 7/5$ which is greater than 1.

c. Graphs are identical and falling.

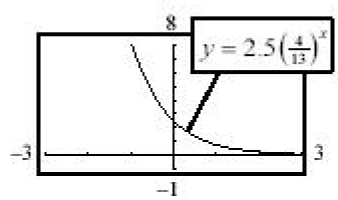




22. a.



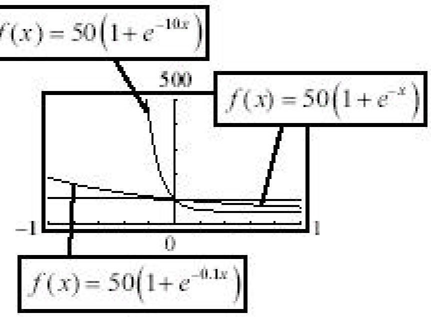
b.



c. $y = 2.5(3.25)^{-x} = 2.5\left(3\tfrac{1}{4}\right)^{-x}$
$= 2.5\left(\frac{13}{4}\right)^{-x} = 2.5\left(\frac{4}{13}\right)^x$

28. $f(x) = 50(1 + e^{-ax})$

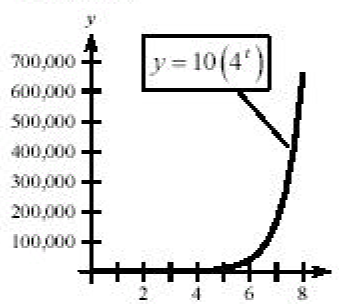
a.



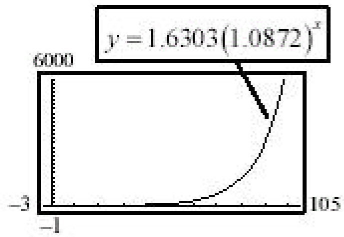
b. As a increases the graphs fall more rapidly toward their common asymptote, $y = 50$. All have the same y-intercept, namely $(0, 100)$.

32. $I = 3200(1.02)^{4(5)} - 3200$
$= \$1555.03$

36.



46. a.



b. For the year 2005, $x = 105$

$y = 1.6303(1.0872)^{105} \approx 10586.7$

The debt in 2005 was predicted to be \$10586.7 billion.

c. Use a graph of $y = 1.6303(1.0872)^x$ and $y = 10000$. The intersection point is the point where the debt will be \$10 trillion or \$10,000 billion. Thus the model predicts that the national debt will be \$10 trillion when $x \approx 104.3$, or in 2004.

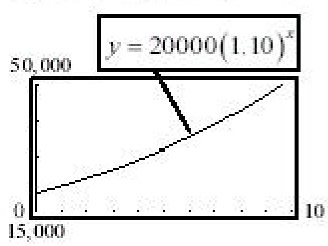
48. a. Letting $x = 0$ correspond to the year 1900, enter the data values $(0, 505)$, $(20, 828)$, $(40, 751)$, etc., and obtain the exponential regression equation $y = 70.4829(1.0878)^x$.

b. In 2000 $x = 100$, so

$y = 70.4829(1.0878)^{100} \approx 318412$ according to the model obtained through exponential regression.

c. The exponential model is not a good fit for this data. The average daily shares increase faster than the exponential curve.

50. a. Enter the data values $(0, 20,000)$, $(1, 22,000)$, etc., and obtain the exponential regression equation $y = 20,000(1.10)^x$.



b. In 30 years, the \$20,000 will grow to

$y = 20,000(1.10)^{30} \approx 348,988.00$.

The money will grow to \$348,988.