## Section 8.5 Exponential Growth Functions

**Assignment:**

*Exponential Growth* increases at the same rate over a unit of time.

Exponential Growth Model

$y = C(1+r)^t$

C = initial amount
r = rate (dec.)
(1 + r) = growth factor
t = time based on compounded.

***Examples***

1. A savings certificate of $1000 pays 6.5% annual interest compounded yearly. What is the balance when the certificate matures after 5 years?

$C = \$1000$
$r = 6.5\% = .065$
$(1+r) = 1.065$
$t = 5$ years

$y = 1000(1.065)^5$
$y \approx \$1370.09$

2. You deposit $800 in a savings account that pays 2.5% annual interest compounded yearly. What is the balance after 3 years?

$C = 800$
$r = .025$
$r+1 = 1.025$
$t = 3$

$C = 800(1.025)^3$
$C \approx \$861.51$

3. An experiment started with 100 bacteria. They double in number every hour.
   a. Write a model for the number of bacteria after 8 hours.

$C = 100$
$r = 1$
$1+r = 2$
$t = 8$

$y = 100(2)^8$
$y = 100(2)^t$ ← model

   b. Find the number of bacteria after 8 hours.

$y = 25,600$ bacteria

## Section 8.6 Exponential Decay Functions

**Assignment:**

*Exponential Decay* decreases the same amount for a unit of time

Exponential Decay Model

$y = C(1-r)^t$

C = initial
r = rate
(1 - r) = decay factor
t = time

***Examples***

1. From 1983 to 1997, the ratio of students per computer at a school has dropped b about 16.8% per year. If there were 103 students per computer in 1983 and 1983 is the base for comparison, what was the number of students per computer in 1997?

C = 103
r = .168
1 - r = .832
t = 14

t = 0 in 1983
t = 14 in 1997
$y = 103(.832)^{14}$
y = 8 students

2. You bought a used boat for $2300. The value of the boat will be less each year because of depreciation. The boat depreciates at the rate of 8% per year.

a. Write an exponential decay model to represent this situation.

C = 2300 r = .08 1 - r = .92 t = t $y = 2300(.92)^t$

b. Estimate the value of the boat in 2 years.

t = 2 $y = 2300(.92)^2$ $y \approx \$1946.72$

c. Estimate the value of the boat in 5 years.

t = 5 $y = 2300(.92)^5$ $y \approx \$1515.89$