

## Growth

$$A = P(1+r)^t$$

$A =$  Balance/Amount

$P =$  Principal (initial)

$t =$  time

$r =$  rate = %

$1+r =$  Growth factor

## Decay

$$A = P(1-r)^t$$

$A =$  Balance/Amount

$P =$  Principal

$t =$  time

$r =$  rate = %

$1-r =$  Decay Factor

## Compound

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

A = Balance/Amount

P = Principal

t = time

r = rate = %

n = How many times compounded

## Comp. Continuously

$$A = Pe^{r \cdot t}$$

A = Balance/Amount

P = Principal

r = rate = %

t = time

$$P(1+r)^t$$

1. In 1990, the cost of tuition at a state university was \$4300. During the next 8 years, the tuition rose 4% each year.

a. Growth or decay? What is the Growth factor?

Grow. Fact.  
1.04

$$P = 4300 \quad r = 4\% = .04$$

b. Write a model that gives the tuition  $y$  (in dollars)  $t$  years after 1990.

$$4300(1+.04)^t$$

c. How much would it cost to attend college in 2000? In 2007?

$$4300(1.04)^{10} = \$6365.05$$

$$4300(1.04)^{17}$$

d. How long it will take for tuition to reach \$6000?

$$\$8375.97$$

$$y = 4300(1.04)^x$$

Between 8-9

2. A 2011 Kia Sorento depreciates at a rate of 33.6% per year. The car was bought for \$32,000.

a. Growth or decay? What is the decay factor?  $.664$

$$P = 32,000 \quad r = 33.6\% = .336$$

b. Write a model that gives the value of the car  $y$  (in dollars)  $t$  years after 2011.

$$32,000(1 - .336)^t$$

c. How much is the car worth now? In 2012?

$$32,000(.664)^1 = 21,248 \quad \text{2012}$$

d. How long will it take for the car to be worth half?

$$\$16,000$$

$$= 32,000(.664)^x$$

Between  
1 & 2

$$P\left(1 + \frac{r}{n}\right)^{nt}$$

3. You invest your \$1000 graduation money. A bank is offering  $r = .04$  4% interest. Calculate how much money you have after 10 years if the bank compounds:

a. Quarterly

$$n=4 \quad 1000\left(1 + \frac{.04}{4}\right)^{4 \cdot 10} = \$1488.86$$

b. Monthly

$$n=12 \quad 1000\left(1 + \frac{.04}{12}\right)^{12 \cdot 10} = \$1490.83$$

c. Daily

$$n=365 \quad 1000\left(1 + \frac{.04}{365}\right)^{3650} = 1491.79$$

d. Continuously

$$Pe^{rt} \quad 1000e^{(.04 \cdot 10)} = 1491.82$$