Growth and Decay:

-The rate of change (dy) of the variable y is proportional to the value of y at any time.

-This is written as:

= *ky*

is the rate of change of y k is the proportionality constant

-Law of Natural Growth: when k>0

-Law of Natural Decay: when k<0

=ky is a separable equation

\*\*Once it is solved for y it is:



c= initial value of y

k=proportionality constant

t= time

Practice:

1. The rate of change of the population of Tahiti is proportional to time. In 1990 (t) the population was 30,000 (y). Tahiti became an extremely popular place to live and the population changed to 90,000 in 1995. What is the population of Tahiti in 2000? (\*\*\*Note 1990 is t=0)

Let’s work through the problem together!

1. List out variables

t=0, y=30,000

t=5, y= 90,000

t=10, y=?

2. Write the equation



3. Plug in “knowns” into the equation to solve for c

(30,000)= *ce^k(0)*

We solve for c, and find out that c=30,000

4. Now we plug in our second set of information to solve for k

(90,000)=(30,000)(e)^(5)(k)

3=e^5k

ln3=5k

k=ln3/5

5. Now let’s solve for y when t=10

y= (30,000)e^(ln3/5)(10)

y=181.399

**6. YAY! We did it!!!**