5.6 GROWTH & DECAY

ESSENTIAL QUESTIONS:

1. How do we operate with exponential growth & decay problems (precalculus-style)?

2. What do differential equations involving growth & decay look like in general?

Exponential Growth $y = Ce^{kt}, k > 0$

Exponential Decay $y = Ce^{kt}, k < 0$

C - initial amount
k - constant of proportionality
t - time

Carbon-14 has a half-life of 5730 years. If 3.2 grams of ^{14}C remain in an object after 1000 years, how much ^{14}C was in the original sample? How much ^{14}C will remian after 10,000 years?

Solve differential equations
separation of variables

1. Rearrange the equations so that all y terms are on the left and all x terms are on the right.
2. Integrate both sides.
3. Use the initial condition to solve for +C.

Solve the differential equations.

1. $y' = \dfrac{\sqrt{x}}{3y}$

2. $y' = x(1+y),\ \ y(0) = 2$

The rate of change of P is proportional to P. When t = 0, P = 250. When t = 1, P = 400. What is the value of P when t = 4?