

4.5-Exponential Growth and Decay

A solution to the differential equation $y' = ky$ is:

Exponential Growth/Decay:

Goal: Use given information to find C and k .

Examples:

Strontium-90 is a radioactive isotope with a half-life of 25 years. If there are 20mg of Strontium present, how much remains after 15 years? When will there be only 5 mg left?

Newton's Law of Cooling states that the rate of change in the temperature of an object is proportional to the difference in temperature between the object and its surroundings. A cup of coffee with an initial temperature of 90°C is in a room that is held at a constant temperature of 20°C . If the liquid cools to 75°C after 5 minutes, what will the temperature be after 15 minutes?

A tank initially contains 100kg of salt dissolved in 2000 liters of water. Pure water enters the tank at a rate of 50 L/min and the mixed solution is drained from the tank at the same rate. Find the amount of salt in the tank after t minutes.

On Your Own: #3, 5a), 9, 11, 13, 15, 19, 21