

Example: A fish population increases at a continuous rate of 30% per year. Suppose that fish are also being harvested by fishermen and other animals at a constant rate of 20 million fish per year. Find a differential equation that will show how the fish population will change over time. i.e. that will model this population.

Example: A drug is administered to a patient intravenously at a rate of 3.5mg per hour. Assume that the amount of the drug that leaves the body each hour is 35.8% of the quantity present. Write a differential equation for the amount of the drug, in milligrams, in the body as a function of time, in hours.

Example: A substance is spilled and if left alone it will decay at a rate that is proportional to the quantity present. Write a differential equation for the quantity, Q , of the substance present at time t .

Is the constant of proportionality positive or negative? Explain your reasoning.

Assume the amount of the substance was measured in tons and time is measured in hours. Adjust the differential equation to take into account that workers can remove 3 tons of the material each hour. Write the new differential equation.

Example: A person deposits \$5000 into an account. The money earns interest at a continuous rate of 7.5% per year. Write a differential equation for the balance in the account, B in dollars, as a function of years, t .

Use the differential equation with the initial amount to compute and interpret the result of $\frac{dB}{dt}$