

Section 1.4 Separable Equations and Applications

Just before midday the body of an apparent homicide victim is found in a room that is kept at a constant temperature of 70F. At 12 noon the temperature of the body is 80F and 1:00pm it is 75F. Assume that the temperature of the body at the time of death was 98.6F and that it has cooled in accord with Newton's law of cooling. What was the time of death?

Newton's law of Cooling is given by: $\frac{dT}{dt} = -k(T - A)$

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Radio Active Decay: Carbon extracted from ancient bone found in a cave has only $1/6$ the amount of C^{14} than samples from bones taken today. How old is the acient bone? The Halflife of C^{14} is 5730 years.

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Crypto Currency is about the only way to earn above 1% interest on your savings. Algorand is a crypto currency that has a variable interest rate based on supply and demand for it ranging from 2% to 8%. Lets suppose the effective interest rate over a 10 year period was 6% compounded continuously. If you had originally bought 10,000 algo how many algo do you have after 10 years?

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To celebrate getting an A in Math 383 you decide to go skydiving jumping out of a plane at 8000ft. After you jump you fall for 15 seconds before opening your parachute. During your fall the drag due to air resistance causes an acceleration of av where v is your velocity. Before the chute opens $a = 0.1$ and after you open the chute $a = 1.6$. How long were you in the air?

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A partial differential equation $\frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}$ A different use of separation of variables.