

**We have four examples of real world situations in this class - population growth, decay of radioactive material, compound interest, and temperature modeled by  $Q(t) = Q_0e^{kt}$ .**

1. Say you invest \$100 into a bank account that earns 10% interest, compounded continuously. How long will it take for you to earn \$300 in interest?
2. Let's say you have a radioactive isotope with a half life of 100 years. If you start with a sample of 60 mg, how long will it be before there is just 10 mg left?



5. Say a couple has a child, and plans for that child to attend UConn in 18 years. They approximate that tuition will be around \$200,000 for four years by that time. Let's say they have a bank account that earns 5%, compounded continuously. How much do they have to deposit today in order to have \$200,000 in 18 years?

6. A radioactive substance decays by 10% in 20 years. How long will it take to decay by 20%?

7. Bacteria are growing. Eww, gross. Anyway, there are 1000 bacteria when they start, and they triple in population every 5 hours. How long until there are 10,000 bacteria?

8. Take a turkey at 180 degrees. Pull it out of the oven, into a room that is 70 degrees. After one hour, the turkey has cooled to 160 degrees. How long until it reaches 150 degrees?

9. A 50 mg sample of radioactive substance decayed to 10 mg in five years. What is the the half-life of the isotope?