Exponential Growth and Decay

1. Your parents saved for your college education by investing a lump sum of $10,000 in a state-supported college fund which paid 10% annual interest compounded annually. If they made this investment when you were 2 years old, how much money will be there when you are 18?

2. Your cousin lives in a different state which paid 10% annual interest compounded daily for their college fund. If his parents also invested $10,000 when he was 2 years old, how much money will be in his fund when he turns 18?

3. The radioactive isotope P-32 has a decay constant of 0.0485. This means that 4.85% of the isotope loses its radioactivity each day.

a) Sketch a graph showing the amount of radioactive isotope if the starting value is 1000 moles.

b) What is the half-life of this isotope?

4. Newton's Law of Cooling says that the rate at which a cup of hot coffee will cool to room temperature is proportional to the difference between the room temperature and the coffee. The constant of proportionality is called the cooling constant.

a) If the initial temperature of the coffee is 80 degrees Celsius and the room temperature is 22, sketch a graph showing the temperature of the coffee as it cools. Assume a cooling constant of 0.03.

b) How long will it take the coffee to reach room temperature? Assume time is measured in minutes.

Ans:
1) $45,949.73 **2) $49,519.47** **3b) 14.3 days** **4b) 200 min.**