1. Susie invests 5000 dollars in a bank account paying 5% interest per year, compounded quarterly for 10 years. How much will Susie have after 10 years?

$P = 5000$ $r = .05$ $n = 4$ $t = 10$

$$A = 5000 \left(1 + \frac{.05}{4}\right)^{4 \cdot 10}$$

$$= 8218.10$$

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

2. Tito invests 5000 dollars in a bank account paying 4% interest per year, compounded continuously for 5 years. How much will Tito have after 5 years?

$P = 5000$ $r = .04$ $t = 5$

$$P = 5000 e^{.04 \cdot 5}$$

$$= 6107.01$$

$$A = Pe^{rt}$$

3. Nicholas wants to invest 2000 dollars for 5 years. He has had two offers. One paying 4.5% per year compounded monthly and the other paying 4.45% compounded continuously. Which is the better investment?

$$r_e = \left(1 + \frac{r}{n}\right)^n - 1 = \left(1 + \frac{.045}{12}\right)^{12} - 1 = .04594$$

use effective interest rate

$$r_e = e^r - 1 = e^{.0445} - 1 = .04550$$

The account paying 4.5 per year compounded monthly

4. Suppose that a bank offers you an account that pays 5% annually compounded continuously. If you plan to deposit $500, how long will it take for you money to double? Round your answer to the nearest year.

$$A = Pe^{rt}$$

$$\frac{1000}{500} = \frac{500 e^{.05t}}{500}$$

$$2 = e^{.05t}$$

$$\ln 2 = \ln e^{.05t}$$

$$\frac{\ln 2}{.05} = \frac{.05t}{.05}$$

$$14 = t$$

5. Suppose that broker tells you that it will take 8 years to double your money on an investment that is compounded continuously. What is the annual interest rate that you will be earning? Round your answer to three decimal places.

$$\frac{2P}{P} = \frac{Pe^{r \cdot 8}}{P}$$

$$2 = e^{8r} \qquad r = \frac{\ln 2}{8} \qquad \qquad 8.7\%$$

$$\frac{\ln 2}{8} = \frac{8r}{8} \qquad = .087$$

6. Find the principle needed now to get the given amount, that is, find the present value.
   To get $50,000 after 10 years at 7% interest compounded quarterly.

$$P = A \cdot \left(1 + \frac{r}{n}\right)^{-nt}$$

$$= 50000\left(1 + \frac{.07}{4}\right)^{-4 \cdot 10}$$

$$= 24980.05$$

$\rightarrow 5\% \leftarrow$ Sorry I left this off 😞

7. If Katie has $4000 to invest per annum compounded monthly, how long will it take before she has $5000? If the compounding is continuous, how long will it be? Need more info Let the Interest rate be 5%

$$5000 = 4000\left(1 + \frac{.05}{12}\right)^{12t}$$

$$\frac{5000}{4000} = \frac{4000(1.00416)^{12t}}{4000}$$

$$1.25 = (1.00416)^{12t}$$

$$\ln 1.25 = \ln(1.00416)^{12t}$$

$$\ln 1.25 = 12t \ln(1.00416)$$

$$t = \frac{\ln 1.25}{12\ln(1.00416)}$$

$$\approx 4.47$$

$$\frac{5000}{4000} = \frac{4000 e^{.05t}}{4000}$$

$$1.25 = e^{.05t}$$

$$\frac{\ln 1.25}{.05} = \frac{.05t}{.05}$$

$$4.46 = t$$

8. What will a $250,000 house cost 2 years from now if the price appreciation for homes over that period averages 11% compounded quarterly.

$$A = 250,000\left(1 + \frac{.11}{4}\right)^{4 \cdot 2}$$

$$= 310595.14$$