Monday, November 21, 2016

8:55 AM













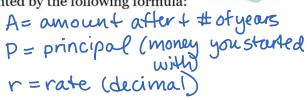
# The Mathematics of Finance

Section 3.6

### INTEREST COMPOUNDED ANNUALLY

The value of an investment after n years is represented by the following formula:

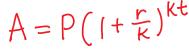
$$A = P(1+r)^{t}$$



1) Find the value of a \$10,000 investment after 5 years at a rate of 2.5%, compounded annually.

$$A = 10,000(1+.025)^{5} = \$11,314.08$$

### INTEREST COMPOUNDED k TIMES PER YEAR





2) Using the info from Problem #1, find the value of the same investment if it is compounded a) monthly 
$$A = 10000(1 + \frac{025}{12})^{12(5)} = 11,330.01$$

b) daily 
$$A = 10,000 \left(1 + \frac{025}{365}\right)^{365(5)} = 11,331.43$$

3) Joe invests \$500 at 4% annual interest rate compounded quarterly. Find the value of Joe's investment in 10 years.

## FINDING THE TIME PERIOD OF AN INVESTMENT

k=12

4) Millie has \$1200 to invest at 5.5% annual interest rate compounded monthly. She desperately wants to buy a used car she saw advertised for \$3800. Assuming the car is still available and the offer

is still good, when would she be able to purchase the car?
$$\frac{3800}{1200} = \frac{1200}{1200} \left(1 + \frac{.055}{12}\right)^{12}t$$

$$\frac{39}{12} = (1 + \frac{055}{12})^{12t}$$

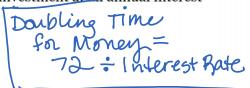
$$\frac{38}{12} = (1 + \frac{055}{12})^{12t}$$

$$12t = \log_{(1 + \frac{055}{12})}^{38}$$

$$t = 21 \text{ years}$$

5) How long would it take you to double your money on a \$1000 investment at an annual interest rate of 10%, compounded annually?

t 
$$\approx 7.27$$
 years



#### FINDING THE INTEREST RATE ON AN INVESTMENT

6) Koko has \$2500 to invest. What annual interest rate compounded quarterly is required for him to double his money in 10 years?



7) If you invest \$100,000 now, and want to have \$1,000,000 when you retire in 30 years, what annual interest rate is required if it is compounded daily?

### INTEREST COMPOUNDED CONTINUOUSLY

The value of an investment compounded continuously (versus a certain number of times per year) is represented by the following formula:

$$A = Pe^{rt}$$

represented by the following formula: A = Pert A = ant after t years P = principal  $e = \text{natural base} \approx 2.718...$ 8) Use the information from Problem #1 to compute the value of the investment if interest is

compounded continuously. P=10,000 r=2,5%

$$A = 10,000e^{-025(5)} = $11,331.48$$

9) If you invest \$1000 at a 4.5% annual interest rate, compounded continuously, how long will it take for your money to double?

