2-9 The Term of a Single Deposit Account

Advanced Financial Algebra

How long should funds ($) remain in a single deposit savings account?

- You need to start now to plan for large expenses in the future.

- When trying to figure out how long money should stay in an account to have saved a certain amount, we must solve for an exponential variable using a logarithm (log).

Example 2 – Solving for an exponential variable

- Anna deposited $1,000 into an account paying 2% annual interest compounded semi-annually. How long will it take for her to have $1,061.52?

- SOLUTION:
- P = $1,000 r = 2% = .02 t = ?? A = $1,061.52n = 2 compounded semi-annually
- A = P$(1 + -)^{(\quad)}$ → $1061.52 = 1000(1 + \frac{.02}{2})^{(2 * \quad)}$
- $1061.52 = 1000 * 1.01^{2t}$ divide both sides of equation by 1000
- $1.06152 = 1.01^{2t}$ change to logarithm form
- $\text{Log}_{1.01} 1.06152 = 2t$ change of base formula
- $\frac{\log 1.06152}{\log 1.01} = 5.999985742 = 2$ divide both sides of equation by 2
- ≈ 3 **<u>It will take about 3 years to have $1,061.52 in the account.</u>**

Example 4

- Nancy and Bob are renovating their kitchen. They deposited $16,000 in an account at 2.4% annual interest compounded monthly. When will they have $20,00 for their kitchen project?

- SOLUTION:
- P = $16,000 r = 2.4% = .024 t = ?? A = $20,000 n = 12 compounded monthly
- A = P$(1 + -)^{(\ )}$ 20000 = 16000$(1 + \frac{.024}{12})^{(12 * \ )}$
- $20000 = 16000 * 1.002^{12t}$ divide both sides of equation by 16000
- $1.25 = 1.002^{12t}$ change to logarithm form
- $\log_{1.002} 1.25 = 12t$ change of base formula
- $\frac{\log 1025}{\log 1.002} = 111.68 = 12$ divide both sides of equation by 12
- ≈ 9.3 **It will take about 9.3 years to save up for the kitchen.**

Example 5 – continuous compounding

- Pete deposits $8,000 into an account paying 3.7% annual interest compounded continuously. How long will it take for him to have $10,000?

- SOLUTION:
- P = $8,000   r = 3.7% = .037   t = ??   A = $10,000
- Use A = P( )( )   for continuous compounding
- $10000 = 8000(\ )^{(.037\ )}$ divide both sides of equation by 8000
- $1.25 = e^{.037t}$ change to logarithm form
- $\log_e 1.25 = .037t$ $\log_e$ is the natural logarithm ln
- $\ln 1.25 = .037t$ divide both sides of equation by .037
- ≈ 6 **<u>It will take about 6 years to have $10,000 in the account.</u>**

Assignment: FIN. ALG. GREY BOOK PG 127 #2, 7, 10 and BLUE ALG. II BOOK pg 489 #64, 67, 71

- #2

In each of the following compound interest equations with t representing the account term, determine the number of times the account is compounded per year (in the first blank) and the interest rate percent (in the second blank).

a. $2254=2000(1.002)^{12t}$ ________ ________

b. $244.04=200(1.01)^{2t}$ ________ ________

c. $6900=6000(1.006)^{6t}$ ________ ________

d. $15669.93=10000(1.00375)^{12t}$ ________ ________

e. $268.57=100(1.025)^{2t}$ ________ ________

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- #7

Jasmine wants to start saving to purchase an apartment. Her goal is to save $225,000. If she deposits $180,000 into an account that pays 3.12% interest compounded monthly, approximately how long will it take for her money to grow to the desired amount? Round your answer to the nearest tenth of a year. ______

- #10

Laura deposits $10,000 into an account that compounds interest continuously at a rate of 2.2%. To the nearest tenth of a year, how long will it take her money to grow to $10,800? ______