

Math 135 Project

This project may be done in a group of two or three total people. If done in a group, then only one copy of the project needs to be turned in for the whole group. The project is to be completed on a separate sheet of paper and written out neatly showing all of your work. You don't need to re-write the whole question on your paper but just the main points. You will be graded on mathematical correctness as well as how organized your work is.

Part I:

Joe just graduated from College and has found a nice job. As a graduation gift his father gave him \$5000 as seed money for a down payment for a condominium that Joe plans to purchase in three years. Joe wants to invest his \$5000 into a savings account that gives him the best rate.

Bank A has an interest rate of 6.02% compounded quarterly.

Bank B has an interest rate of 6% compounded monthly.

Which bank's savings account should Joe go with so that he can earn the most money at the end of the three years?

Hint: When P_0 is invested in a savings account for t years under the interest rate r (in decimal form), and the interest is compounded n times each year, and then the end balance is computed by

$$P = P_0 \left(1 + \frac{r}{n} \right)^{nt}.$$

Part II:

Since Joe plans to buy a condominium in three years, he needs to save more money for the down payment. Joe goes to Bank B and wants to open another savings account where he plans to deposit \$400 every month. This account also pays 6% compounded monthly. How much money will he have saved at the end of three years in this account?

Hint: This is an ordinary annuity problem. The future value, A , of an annuity is found with the formula

$$A = m \left[\frac{\left(1 + \frac{r}{n} \right)^{nt} - 1}{\frac{r}{n}} \right].$$

(Turn over for page 2 on the back)

Part III:

Joe is not happy with the amount he accumulates in part II. Help Joe find out how much money he needs to put away each month so that he could accumulate \$20,000 at the end of three years. (This is not counting the money he gets in Part I.)

Part IV: Installment Payment

Jennifer wants to buy a \$30,000 car. She has \$5,000 to put as a down payment and needs to borrow \$25,000. Help Jennifer find out what her monthly payment will be if she plans to pay monthly over a 5-year period at a 6% interest rate.

1. Divide the interest rate (in decimal form) by the number of payments per year. Save the result for the next step and a future step.
2. Add 1 to the result of step 1.
3. Raise the result of step 2 to the power equal to the total number of payments to be made (the product of the number of years and the number of payment per year.) Save the result for the next step and for a future step.
4. Subtract 1 from the result of step 3.
5. Divide the result of step 3 by the result of step 4.
6. Multiply the result of step 5 by the amount of the original loan.
7. Multiply the result of step 6 by your result from step 1. The answer is the amount of the installment payment.

Part V:

Let P denote the original amount of the loan, let r denote the annual interest rate, let n denote the number of payments per year, and let t denote the number of years. Use the seven steps given in part IV to find an algebraic formula for computing the payment installment amount m .

(Part V is going to have 7 steps just like part IV, but this time, you will have variables and will be coming up with a formula at the end instead of a dollar amount. Show all 7 steps numbered 1 through 7 just like in part IV.)