

Section 4A: Homework Solutions

Do the following make sense?

9. Simple Bank was offering simple interest at 5% per year, which was clearly a better deal than the 4.5% compound interest rate at Complex Bank.

Solution:

This statement does not make sense. We do not have enough information to make a comparison, but generally speaking Complex Bank will return more money since compounding of interest returns more than simple interest.

□

10. Both banks were paying the same annual percentage rate, but one had the higher annual percentage yield than the other.

Solution:

This statement makes sense. One bank could be compounding the interest more often than the other which would result in a higher APY for a fixed APR.

□

Solve the following equations

15. $x - 4 = 6$. Adding 4 to both sides of the equation, we find $x = 10$.

□

16. $x - 8 = 2$. Adding 8 to both sides of the equation, we find $x = 10$.

□

27. $4x + 8 = 24$ Subtracting eight from both sides we find the equation

$$4x = 16$$

Dividing by 4 gives $x = 4$.

□

28. $s + 4 = 24 - 4s$ Adding $4s$ to both sides we obtain the equation

$$5s + 4 = 24$$

Subtracting 4 from both sides we find

$$5s = 20$$

Dividing by 5 we get $s = 4$.

□

30. $6 - 2y = 9 - y$ From methods similar to the above, we find $y = -3$

□

Calculate your return:

33. You invest \$2000 in an account that pays simple interest of 3% for 20 years

Solution:

The annual interest is $2000 \cdot .03 = \$60$. So in 20 years, we make $20 \cdot 60 = 1200$ in interest. So we are returned 3200 from the original investment.

□

34. You invest \$5000 in an account that pays simple interest of 6.5% for 20 years.

Solution:

The annual interest is $5000 \cdot 0.065 = \$325$. So over 20 years the interest comes to $325 \cdot 20 = \$6500$. The investment is then worth \$11,500.

□

42. Find your return if you invest \$40,000 at an APR of 8.5% for 30 years.

Solution:

$$40,000 \cdot (1 + .085)^{30} = \$462,330.07$$

□

44. A \$2000 deposit at an APR of 3% with daily compounding for 5 years.

Solution:

$$A = 2000(1 + 0.03/365)^{1825} = \$2323.65$$

□

For the following, find the return for continuously compounding interest after 1,5, and 20 years. Find the APY for each account.

59. A \$5000 deposit in an account with an APR of 6.5%

Solution:

For 1 year

$$A = 5000e^{0.065 \cdot 1} = \$5335.80$$

and the APY is

$$\frac{335.80}{5000} = 0.06716$$

For 5 years

$$A = 5000e^{0.065 \cdot 5} = \$6920.15$$

For 20 years

$$A = 5000e^{0.065 \cdot 20} = \$18,346.48$$

□

60. A \$500 deposit in an account with an APR of 7%

Solution:

$$A = 500e^{0.07 \cdot 1} = \$536.25$$

and the APY is

$$\frac{36.25}{500} = 0.0725$$

For 5 years

$$A = 500e^{0.07 \cdot 5} = \$709.53$$

For 20 years

$$A = 500e^{0.07 \cdot 20} = \$2027.60$$

□

77. You want to accumulate \$75,000 for your retirement in 35 years. you have two choices. Plan A is an account with annual compounding and an APR of 5%. Plan B is an account with continuous compounding and an APR of 4.5%. how much of an investment does each plan require to reach your goal?

Solution:

Under Plan A you must start with a principal of

$$P = \frac{75000}{(1 + 0.05)^{35}} = 13596.77$$

Under Plan B, you must start with a principal of

$$P = \frac{75000}{e^{.045 \cdot 35}} = \$15525.57$$