

Math 1313 - Chapter 4 review

1. Anna wants to have \$5,000 saved when she graduates from college so that she will have a down payment for a new car. Her credit union pays 5% annual interest compounded monthly. How much money should she deposit each month to have the money available when she graduates in 3 years?

Sinking Fund $i = \frac{0.05}{12}$ $F = 5000$
 $n = 3(12) = 36$

$$E = \frac{iF}{(1+i)^n - 1} = \frac{\frac{0.05}{12} \cdot 5000}{\left(1 + \frac{0.05}{12}\right)^{36} - 1} = \$129.02$$

2. Bill bought a new car. His financing deal was a 5 year loan at 9.98% annual interest compounded monthly. His monthly payment was \$421.25 and he paid no money down. What was the total purchase price of the car?

PVA $P = E \left[\frac{1 - (1+i)^{-n}}{i} \right]$

$E = 421.25$
 $i = \frac{0.0998}{12}$
 $n = 60$

$$P = 421.25 \left[\frac{1 - \left(1 + \frac{0.0998}{12}\right)^{-60}}{\left(\frac{0.0998}{12}\right)} \right] = \$19835.47$$

3. Sergio wants to have \$5,000 in the bank in 3 years to pay for an Alaskan cruise. How much cash should he deposit today, if the bank pays 4% annual interest compounded quarterly, if he wants to be sure to have the funds available in 3 years?

PV with CI $P = F(1+i)^{-n}$

$i = \frac{0.04}{4}$ $n = 3(4) = 12$

4. Edwin and Frances are buying a new home. The purchase price is \$155,000. They will make a 10% down payment on the house. Their loan for the house is a 30 year conventional loan at 6.75% per year compounded monthly. Find their monthly payment.

Amortization

$$P = 155000(0.9) = 139500$$

$$E = \frac{iP}{1 - (1+i)^{-n}}$$

$i = \frac{0.0675}{12}$
 $n = 30(12) = 360$

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5. Grace decides to start a savings program when she gets her first job after graduation. She deposits \$2,500 into her credit union savings account. The credit union pays 3.8% annual interest compounded quarterly. How much money will she have in the account after 4 years?

FV, C.I

$$F = P(1+i)^n$$

$$i = \frac{0.038}{4} \quad n = 4(4) = 16$$

$$= 2500 \left(1 + \frac{0.038}{4}\right)^{16} = 42908.31$$

6. Helen bought a new computer. The finance company charged her 15% per year compounded monthly. Her monthly payments were \$88.23 for 2 years and she made no down payment. What was the original price of the computer?

P, VA

$$P = E \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$E = 88.23 \quad P = 88.23 \left[\frac{1 - \left(1 + \frac{0.15}{12}\right)^{-24}}{\left(\frac{0.15}{12}\right)} \right]$$

$$i = \frac{0.15}{12} \quad n = 24 \quad = \$1819.68$$

7. Gary decided to save some money for his daughter's college education. He decided to save \$300 per quarter. His credit union pays 4.5% per year compounded quarterly. How much money will he have available when his daughter starts college in 10 years?

F, VA

$$F = E \left[\frac{(1+i)^n - 1}{i} \right]$$

$$= 300 \left[\frac{\left(1 + \frac{0.045}{4}\right)^{40} - 1}{\left(\frac{0.045}{4}\right)} \right]$$

$$= 15050.05$$

8. Jolene owns a clothing store. She anticipates that she will need to replace her telephone system in 3 years. She projects that a new system will cost \$12,500. Her bank pays 5% annual interest compounded semiannually. How much should she deposit semiannually in order to be able to pay cash for the new phone system?

S, F

$$E = \frac{iF}{(1+i)^n - 1} = \frac{\left(\frac{0.05}{2}\right)(12,500)}{\left(1 + \frac{0.05}{2}\right)^6 - 1} = 1956.87$$

9. Kris wins the lottery and decides to deposit \$25,000 of his winnings in an account for his nephew. The bank pays 6.2% annual interest compounded monthly. How much will he be able to give his nephew in 5 years?

FV with CI

$$F = P(1+i)^n$$

$$= 25000 \left(1 + \frac{0.062}{12}\right)^{60}$$

$$= \$34058.44$$

10. Megan bought a new car. Her car payments are \$385.17 for 6 years. Her financing rate was 8.9% annual interest compounded monthly. She made a \$1,200 down payment. What was the total purchase price of the car?

PVA

$$P = E \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$= 385.17 \left[\frac{1 - (1 + \frac{0.089}{12})^{-72}}{(\frac{0.089}{12})} \right] + 1200$$

$$= \$22626.97$$

11. A company has an immediate need for a loan. In an agreement worked out with its banker, the company assigns its royalty income of \$4,800 per month for the next 3 years from certain oil properties to the bank, with the first payment due at the end of the first month. If the bank charges interest at the rate of 9% per year compounded monthly, what is the amount of the loan negotiated between the parties?

PVA

$$i = \frac{0.09}{12}$$

$$n = 3(12)$$

$$= 36$$

$$P = E \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$= 4800 \left[\frac{1 - (1 + \frac{0.09}{12})^{-36}}{(\frac{0.09}{12})} \right]$$

$$= \$150944.67$$

12. Carol's employer deposits \$1,000 per quarter into a retirement plan that earns 3.5% annual interest compounded quarterly. How much will be in the plan when she retires in 32 years?

FVA

$$i = \frac{0.035}{4}$$

$$n = 32(4)$$

$$= 128$$

$$F = E \left[\frac{(1+i)^n - 1}{i} \right]$$

$$= 1000 \left[\frac{(1 + \frac{0.035}{4})^{128} - 1}{(\frac{0.035}{4})} \right]$$

$$= \$234281.12$$

13. Kelly wishes to buy a car that costs \$32,998. The car dealer tells her that they can finance the car at 6.25% per year compounded monthly for 5 years. She decides to secure the loan from the dealer. How much will her monthly payments be?

Amortization

$$i = \frac{0.0625}{12}$$

$$n = 5(12) = 60$$

$$E = \frac{iP}{1 - (1+i)^{-n}}$$

$$= \frac{\left(\frac{0.0625}{12}\right) 32998}{1 - \left(1 + \frac{0.0625}{12}\right)^{-60}} = \$641.79$$

14. David owns a small business and knows that he will need to purchase two new delivery vans in 5 years. He anticipates that the vans will cost the business \$28,500 each. His bank pays 4.2% per year compounded monthly. How much should he deposit each month so that he will have the funds available to buy the vans in 5 years?

SF.

$$i = \frac{0.042}{12}$$

$$n = 60$$

$$E = \frac{iF}{(1+i)^n - 1}$$

$$= \frac{\left(\frac{0.042}{12}\right) 28500}{\left(1 + \frac{0.042}{12}\right)^{60} - 1}$$

$$= \$427.697 \text{ - one van}$$

For vans

$$= 2 \times 427.697$$

$$= \$855.39$$

15. Mary deposited \$5,000 in an account that earns 9% per year compounded monthly. How much will she have in 40 years, when she retires?

FV with CI

$$F = P(1+i)^n$$

$$= 5000 \left(1 + \frac{0.09}{12}\right)^{480}$$

$$= \$180599.51$$

16. Denise wishes to have \$6,000 in an account in 3 years. Her bank will pay 3.25% per year compounded semiannually. How much should she deposit now to have the desired amount of money in the account in 3 years?

PV with CI

$$P = F(1+i)^{-n}$$

$$= 6000 \left(1 + \frac{0.0325}{2}\right)^{-6}$$

$$= 5446.88$$

17. Parents agree to invest \$500 at 10% per year compounded semiannually for their son on the December 31 or June 30 following each semester that he makes the Dean's list during his 4 years in college. If he makes the Dean's list in each of the 8 semesters, how much money will his parents have to give him when he graduates in 4 years?

FVA

$$F = E \left[\frac{(1+i)^n - 1}{i} \right]$$

$$= 500 \left[\frac{(1 + \frac{0.1}{2})^8 - 1}{(\frac{0.1}{2})} \right]$$

$$= \$4774.55$$

18. A health club offers to let you join for \$50 down and payments of only \$36 per month for 3 years. When you read the fine print, you discover that the interest rate is 18% per year compounded monthly. What is the cash price of the health club membership? How much will the club membership cost you after 3 years?

PVA

$$P = E \left[\frac{1 - (1+i)^{-n}}{i} \right] + 50$$

$$= 36 \left[\frac{1 - (1 + \frac{0.18}{12})^{-36}}{(\frac{0.18}{12})} \right] + 50$$

$$= \$1045.78$$

$\hookrightarrow = (36)(12)3 + 50$
 $= \$1346$

19. Nicholas and Olivia are buying a house for \$250,000. They made a 15% down payment. Their financing is for 30 years at 6.78% annual interest compounded monthly. Find their monthly payment.

Amortization

$$P = 250000(0.85)$$

$$= 212500$$

$$n = 30(12) = 360$$

$$E = \frac{iP}{1 - (1+i)^{-n}}$$

$$= \frac{(\frac{0.0678}{12})(212500)}{1 - (1 + \frac{0.0678}{12})^{-360}}$$

$$= \$1382.51$$

20. A lending company recently offered 36-month auto loans at 7.56% per year compounded monthly to applicants with good credit ratings. If you have a good credit rating and can afford monthly payments of \$350, how much can you borrow from the company?

PVA

$$P = E \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$= 350 \left[\frac{1 - (1 + \frac{0.0756}{12})^{-36}}{(\frac{0.0756}{12})} \right]$$

$$= \$11,241.81$$

Solutions:

1. Sinking Fund; \$129.02
2. Present Value of an Annuity; \$19,835.47
3. Present Value with compound interest; \$4,437.25
4. Amortization; \$904.79
5. Future Value with compound interest; \$2,908.31
6. Present Value of an Annuity; ~~\$2,084.70~~ 41819.68
7. Future Value of an Annuity; \$15,050.05
8. Sinking Fund; \$1,956.87
9. Future Value with compound interest; \$34,058.44
10. Present Value of an Annuity; \$22,626.97
11. Present Value of an Annuity; \$150,944.67
12. Future Value of an Annuity; \$234,281.12
13. Amortization; \$641.79
14. Sinking Fund; \$855.39
15. Future Value with compound interest; \$180,549.51
16. Present Value with compound interest; \$5,446.88
17. Future Value of an Annuity; ~~\$3,231.61~~ 4774.55
18. Present Value of an Annuity; \$1,045.78; \$1,346.00
19. Amortization; \$1,382.51
20. Present Value of an Annuity; \$11,241.81