

Foundations of Mathematics 12 – Chapter 1 Review

CHAPTER 1 REVIEW

1. Hal invested \$40 000 at an interest rate of 6% compounded annually. He wants to know how long it will take for the investment to double.

a. Estimate the doubling time. Verify your answer.

Rule of 72: $\frac{72}{6\%} \approx 12 \text{ yrs.}$

*N = 11.9 yr
 I = 6
 PV = -40 000
 FV = 80 000
 P/Y = 1
 C/Y = 1
 Begin
 $\approx 12 \text{ yr}$

b. How long would it take for the investment to double if the interest was simple

$$A = P(1 + rt)$$

$$80000 = 40000(1 + 0.06t)$$

$$2 = 1 + 0.06t$$

$$\frac{1}{0.06} = \frac{0.06t}{0.06}$$

$$t \approx 17 \text{ yrs}$$

2. Val has \$12 000 and wants it to grow to \$50 000. She has narrowed the possibilities to the following two investment options:

a. 6% compound semi-annually

Choose "a" → shorter time!!!

b. 5.1% compounded quarterly

Which option should she choose? Why?

*N = 48.3
 I% = 6
 PV = -12000
 PMT = 0
 FV = 50000
 P/Y = 2
 C/Y = 2
 Begin
 time = $48.3 \div 2 = 24.15 \text{ yr}$

*N = 112.64
 I% = 5.1
 PV = -12000
 PMT = 0
 FV = 50000
 P/Y = 4
 C/Y = 4
 time = $112.64 \div 4 = 28.16 \text{ yr}$

3. Warren started investing when he was 5 years old. He deposited \$5 from his allowance at the end of every month into a savings account that earned 5.80%, compounded monthly. He did this until he was 25 years old.

a. How much did he invest altogether? What is the current value of his investment at age 25? What is his rate of return?

N = $20 \text{ yr} \times 12 \rightarrow \$5 \times 12 \times 20 = \1200
 I% = 5.8
 PV = 0
 PMT = -5
 FV = solve
 P/Y = 12
 C/Y = 12
 End
 Total Investment.
 $\rightarrow \$2256.24$
 Rate of return = $\frac{\text{Interest}}{\text{Investment}} = \frac{2256.24 - 1200}{1200} = 88\%$

- b. Suppose that Warren had wanted his investment to have the same value as in part a) at age 25, but had started investing when he was 20. What would his monthly payments have been?

$N = 5\text{yr} \times 12 = 60$
 $I\% = 5.8$
 $PV = 0$
 $*PMT = \rightarrow \$32.50/\text{month}$
 $FV = 2256.24$
 $P/Y = 12$
 $C/Y = 12$

4. Both Alex and Jamie have an investment portfolio.

- a. What is the current value of each portfolio?
 b. Who has the greater rate of return? Explain.

Alex's portfolio:

- pv one time • A 10-year \$5000 GIC, purchased 9 years ago, that earns 2.6%, compounded annually
- pv • A 5-year \$2000 CSB, purchased 4 years ago, that earns 3.1%, compounded semi-annually
- pmt • A savings account at 1.4%, compounded weekly, into which he has been making weekly deposits of \$15 for 5 years

$N = 9$
 $I\% = 2.6$
 $PV = -5000$
 $PMT = 0$
 $*FV = ? \rightarrow 6299.36$
 $P/Y = 1$
 $C/Y = 1$
 $Begin$
 $N = 4 \times 2$
 $I\% = 3.1$
 $PV = -2000$
 $PMT = 0$
 $*FV = ? \rightarrow 2261.88$
 $P/Y = 2$
 $C/Y = 2$
 $N = 5\text{yr} \times 52$
 $I\% = 1.4$
 $PV = 0$
 $PMT = -15$
 $*FV = ? \rightarrow 4039.18$
 $P/Y = 52$
 $C/Y = 52$
 End

Total Investment
 $\$5000 + \$2000 + \underbrace{\$15 \times 5\text{yr} \times 52}_{\$3900}$
 $\$10,900$

FV Total
 $\$6299.36 + \$2261.88 + \$4039.18$
 $\$12,600.42$

Rate of Return = $\frac{\$12600.42 - 10900}{10900}$
 $= 15.6\%$

Jamie's portfolio:

- * A 10-year \$3000 bond, purchased 9 years ago, that earns simple interest at 2.7%
- * A 3-year \$700 CSB. Purchased 3 years ago, that earns 2.8%, compounded semi-annually
- A high-interest savings account, at 1.7%, compounded monthly, into which she has been making monthly deposits of \$100 for 6 years

$* A = P(1 + rt)$
 $= 3000 [1 + 0.027(9)]$
 $= \$3729$ 1.243

$N = 3 \times 2$
 $I = 2.8$
 $PV = -700$

$*FV = \$760.90$
 $P/Y = 2$
 $C/Y = 2$
 $Begin$

$N = 6 \times 12$
 $I = 1.7$
 $PMT = -100$

$*FV = \$7574.39$
 $P/Y = 12$
 $C/Y = 12$
 End

Assignment: p. 71 #1, 2, 4, 6 – 8, 10 – 12

Total Investment = $\$3000 + \$700 + \$100 \times 6\text{yr} \times 12 = \10900

FV = $\$3729 + \$760.90 + \$7574.39 = \12064.29

Rate of Return = $\frac{\$12064.29 - \$10900}{\$10900} = 10.7\%$