

Exam Review: Financial Mathematics

1. $A = ?$

$$P = 4500$$

$$i = 0.06/12 = 0.005$$

$$n = 5 \times 12 = 60$$

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

$$= 4500(1+0.005)^{60}$$

$$= 4500(1.005)^{60}$$

$$= \$6069.83$$

2. $A = \$10000$

$$P = ?$$

$$i = 0.05/4 = 0.0125$$

$$n = 6 \times 4 = 24$$

$$P = \frac{A}{(1+i)^n}$$

$$= \frac{10000}{(1+0.0125)^{24}}$$

$$= \frac{10000}{(1.0125)^{24}}$$

$$= \frac{10000}{(1.0125)^{24}}$$

$$= \$7421.97$$

3. Future value annuity

$$A = ?$$

$$R = 50$$

$$i = 0.04/12 = 0.00\bar{3}$$

$$n = 25 \times 12 = 300$$

$$A = \frac{R[(1+i)^n - 1]}{i}$$

$$= \frac{50[(1+0.00\bar{3})^{300} - 1]}{0.00\bar{3}}$$

$$= \$25706.48$$

4. Future value annuity

$$A = 500000$$

$$R = ?$$

$$i = 0.03/12 = 0.0025$$

$$n = 25 \times 12 = 300$$

$$R = \frac{Ai}{[(1+i)^n - 1]}$$

$$= \frac{500000(0.0025)}{(1+0.0025)^{300} - 1}$$

$$= \frac{500000(0.0025)}{(1+0.0025)^{300} - 1}$$

$$= \$1121.06$$

$$5. \text{ Mortgage (Loan)} = 325000 - 100000 \\ = \$225000$$

$$\text{Semi-annual rate} = \frac{3.5\%}{2} = 1.75\% = 0.0175$$

$$\text{Monthly rate} \\ \sqrt[6]{(1+i)^6} = \sqrt[6]{1.0175} \\ 1+i = 1.002895623966127 \\ i = 0.002895623966127$$

Present value annuity

$$P = 225000 \quad R = \frac{P \cdot i}{1 - (1+i)^{-n}} \\ R = ? \\ i = 0.0028956... \\ n = 25 \times 12 = 300 \\ = \frac{225000(0.0028956...)}{1 - (1.0028956...)^{-300}} \\ = \$1123.36$$

6. Present value annuity

$$P = ? \quad P = \frac{R[1 - (1+i)^{-n}]}{i} \\ R = 1500 \\ i = 0.06/12 = 0.005 \\ n = 25 \times 12 = 300 \\ = \frac{1500[1 - (1.005)^{-300}]}{0.005} \\ = \$232810.30$$

7. Two reasons

1. Inflation → Even though he may get \$1500 in five years from now, \$1500 will be worth less since \$1500 can purchase less tomorrow than it can today.
2. Taxes → Money earned from investments is considered income. The government will take some of the \$500 that you earned in interest.