University of Bahrain
Bahrain Teachers College
TC2MA324: History of Mathematics
Dr. Abdulla Eid
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Quiz 6

Name: _____ Solution _____

1. (2 points) Find the Maturity (future) value *and* the amount of simple interest of saving 300 **BHD** at 3% for 11 months.

$$I = P r n = 300 \times \frac{3}{100} \times \frac{11}{12} = 8.25 \quad BHD$$

$$A = P + I = 308.25 \quad BHD$$

2. (2 points) You bought a laptop that costs 430 **BHD** using a credit card that charges 1.5% annually. Supposed you have not paid anything for 18 months. How much you owe the bank and how much is the bank interest?

$$A = P(1 + i)^{n \cdot m} = 430 \left(1 + \frac{1.5}{1200}\right)^{18} = \text{439.77} \quad BHD$$

$$I = A - P = \text{439.77} - 430 = \text{9.77} \quad BHD$$

3. (3 points) Find the maturity *and* the saving interest of investing 100 **BHD** each month in an account that pays 2.2% annually for 10 years?

$$A = R \frac{\left[(1+i)^{n \cdot m} - 1\right]}{i} = 100 \frac{\left[\left(1 + \frac{0.022}{12}\right)^{120} - 1\right]}{\frac{0.022}{12}}$$

$$A = 13408.67$$

$$I = A - 10 \times 12 \times 100 = 13408.67 - 12000$$
$$= 1408.67 \quad BHD$$

4. (3 points) The inflation rate in the Kingdom of Bahrain for March 2015 was 2.2% per year. Assume a fast–food meal costs 1.800 **BHD** and assume the inflation rate will continue as it is, how many months it will take for the meal to cost 2.000 **BHD**?

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

$$2 = 1.8\left(1 + \frac{0.022}{12}\right)^{12n} \rightsquigarrow 2 = 1.8(1.0018)^{12n}$$

$$12m = \frac{\log \frac{2}{1.8}}{\log(1.0018)} \rightsquigarrow n \approx 4.79$$

So after 57 months

5. (3 points)   1. Derive a formula that can be used to find the monthly installment R of an amortization of a loan P with annual rate r to be paid back in n years.

$$P(1+i)^{n \cdot m} = \frac{R\left[(1+i)^{n\,m} - 1\right]}{i}$$

$$\frac{Pi(1+i)^{n \cdot m}}{\left[(1+i)^{n \cdot m} - 1\right]} = R$$

$$\boxed{\frac{Pi}{\left[1 - (1+i)^{-nm}\right]} = R}$$

2. Use the formula you derived above to find the monthly installment of a house costs $144,000$ **BHD** with interest rate 6% annually and to be paid back in 30 years.

$$R = \frac{144000 \times \frac{0.06}{12}}{\left[1 - \left(1 + \frac{0.06}{12}\right)^{-30 \times 12}\right]} = 863.352 \text{ BHD}$$

$$I = 30 \times 12 \times R - P_2 = 166806 \text{ BHD}$$