Chris Nutter

CALIFORNIA STATE UNIVERSITY, FULLERTON

Computer Engineering

EGCP 401 – Engineering Economics & Professionalism
(Spring 2021)
Homework no 3 (Due date: 03/10/2021)

Q3-22 Alvin's Uncle Arnold gave him $16,000 from selling the old family farm. Alvin wants to start college and have $12,000 avaiable to buy a used car when he graduates in 4 years. Alvin earns 2% in hios savings account. How much can he spend on a motorcycle now and still have enough grown to the $12,000 he needs when he graduates?

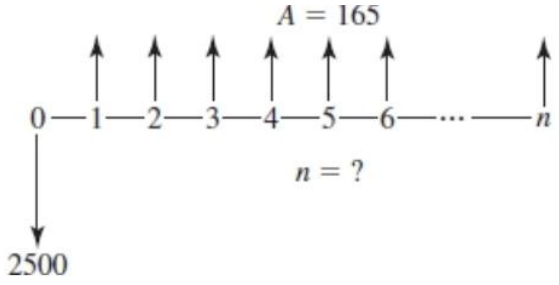
Q3-33 A firm paid $160,000 for a building site two years ago. It is now worth $200,000, and firm's plans have changed so that no building is planned. The firm estimates that the land will be woth $240,000 in four years. If the firm's interest rate is 5%, what should it do?

Q3 -46 A bank is offering to sell 6-month certificates of deposits for $12,000. At the end of 6 months, the bank will pay $13,000 to the certificate's owner. Compute the nominal annual interest rate and the effective annual interest rate.

Q3-55 Jill deposited $8,000 into a bank for 6 months. At the end of that time, she withdrew the money and received $8250. If the bank paid interest based on continuous compounding:

a) What was the effective annual interest rate?
b) What was the nominal annual interest rate?

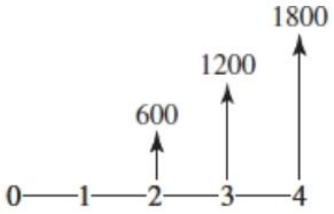
Q4-10 For what value of n, based on a 5% interest rate, do these cash flows have a present value of 0?



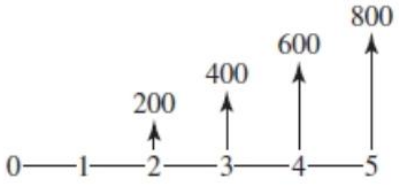
Q 4-24 Tori is planning to buy a car. The maximum payment she can make is $3400 per year, and she can get a car loan at her credit union for 7.3%interest. Assume her payments will be made at the end of each year 1–4. If Tori's old car can be traded in for $3325, which is her down payment, what is the most expensive car she can purchase?

Q4-42 A woman made 7 annual end-of-year purchases of $3500 worth of common stock. The stock paid no dividends. Then for 8 years she held the stock. At the end of the 8 years she sold all the stock for $38,000. What interest rate did she obtain on her investment?+

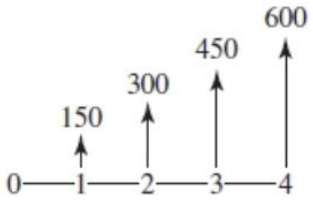
Q4-52 Assume an 8% interest rate and find S, T, and X.



(*a*) S = value at $t = 0$



(*b*) T = uniform value for 5 periods



(*c*) X = value at $t = 0$

Q4-66 A debt of $5000 can be repaid, with interest at 8%, by the following payments. How much is X?

Year	Payment
1	$ 500
2	1000
3	1500
4	2000
5	*X*

Q3-22)

12000 available
4 years

$$\frac{12000}{(1+0.02)^4}$$

$$\frac{12000}{1.08243216}$$

11086.15

16 000 - 11086.15

4913.85

He can spend $4913.85

Q3-33)

$200000(1+0.05)^4$

$200000(1.2155)$

243100

They should sell the building because the current price is higher than 4 years.

Q3-46)

$$\text{nominal} = \left(\frac{13000}{12000}\right) = 0.0833 = 8.33\% \times 2 = 16.67\%$$

$$\text{Effective} = \left(1+\frac{i}{n}\right)^n - 1 \rightarrow (1+0.0833)^2 - 1 = 17.36\%$$

Q3-55)

8250 - 8000 = 250

a) $(1+0.03125)^2 - 1 = 0.06347 = 6.347\%$

b) $F = Pe^{rn}$

$$\frac{8250}{8000} = e^{r(1)}$$

$$\ln\left(\frac{8250}{8000}\right) = r$$

$0.03077 \times 2 = 6.15\%$

Q 4-10)

$$\text{Present Value} = A\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right] = 2500$$

$$165\left[\frac{1.05^n - 1}{0.05(1.05)^n}\right] = 2500$$

$$\frac{165}{165}\left[\frac{1.05^n - 1}{0.05(1.05)^n}\right] = \frac{2500}{165}$$

$$\frac{1.05^n - 1}{0.05(1.05)^n} = \frac{25}{33}$$

$$(1.05)^n - 1 \cdot \frac{1}{0.05} \cdot \frac{1}{(1.05)^n} = \frac{25}{33}$$

$$\left(\frac{1}{1.05}\right)^n = \frac{8}{33}$$

$$1.05^n = \frac{33}{8}$$

$$n = \frac{\log\left(\frac{33}{8}\right)}{\log(1.05)}$$

$$n = 29.044$$

29 years

Q 4-24)

$$\text{Present Worth} = \frac{A}{r}\{1-(1+r)^{-n}\}$$

$$= \frac{3400}{0.073}\{1-(1+0.073)^{-4}\}$$

$$= 11438.95$$

$$= 11438.95 + 3325$$

Car = $14763.95

Q 4-42)

$$38000 = 3500(1+r)^{14} + 3500(1+r)^{13} + 3500(1+r)^{12} + 3500(1+r)^{11} + 3500(1+r)^{10} + 3500(1+r)^{9} + 3500(1+r)^{8}$$

$r \approx 0.0404$ $\quad r \approx -2.21790$

$r = 4.04\%$

Q 4-52)

a)

$$S = 600(P/G, 8\%, 4)$$

$600 \cdot 4.65$

2790.06

b)

$$T = 200(A/G, 8\%, 5)$$

$$200\left(\frac{1}{.08} - \frac{5}{(1+.08)^5 - 1}\right)$$

$200(1.846)$

369.29

c)

$$X = 150(P/G, 8\%, 5) \times (F/P, 8\%, 1)$$

$$150\left(\frac{1}{.08} - \frac{4}{1+.08^4-1}\right) + 150\left[\frac{1}{.08} - \frac{(1.08)^4}{.08(1+.08)^4}\right]$$

$150 \times 2.37 \times 1.08$

1194.53

Q 4-66)

$$PV = \sum \frac{FV}{(1+i)^n}$$

$$\frac{500}{(1.08)} + \frac{900}{(1.08)^2} + \frac{1300}{(1.08)^3} + \frac{1700}{(1.08)^4}$$

$462.96 + 771.60 + 1031.98 + 1249.63$

3516.17

$5000 - 3516.17 = 1483.82$