



GENERAL MATHEMATICS 2024

Unit 3

Key Topic Test 7 – Recursion and Financial Modelling: Annuities and Perpetuities

Recommended writing time*: 45 minutes

Total number of marks available: 25 marks

SOLUTIONS

SECTION A – Multiple Choice (1 mark per question)

Question 1

Answer: C

$$\frac{4.2}{400} \times P = 8200$$

$$P = 780\,952.38$$

Question 2

Answer: D

Finance Solver	
N:	1
I(%):	5.86
PV:	610000
Pmt:	-2978.8333333333
FV:	-610000
PpY:	12

Question 3

Answer: B

Finance Solver	
N:	120
I(%):	3.8
PV:	-225000
Pmt:	2256.6901780322
FV:	0
PpY:	12

Question 4

Answer: D

Finance Solver	
N:	60
I(%):	3.8
PV:	-225000
Pmt:	2256.69
FV:	123138.74083849
PpY:	12

Question 5

Answer: A

$$A_0 = 845\,000, \quad A_{n+1} = 1.002A_n - 3100$$

SECTION B – Short Answer**Question 1**

a. $\frac{r}{1200} \times 210000 = 1085$
 $r = \frac{1085 \times 1200}{210000}$
 $r = 6.2\%$

1 mark

b.

<i>Payment number</i>	<i>Payment</i>	<i>Interest</i>	<i>Principal reduction</i>	<i>Balance of the annuity</i>
0	-	-	-	210 000
1	1800.00	1085	715	209 285
2	1800.00	1081.31	718.69	208 566.31
3	1800.00	1077.59	722.41	207 843.90

3 marks

c. 180 months or 15 years

Finance Solver

N: 179.156601182

I(%): 6.2

PV: -210000

Pmt: 1800

FV: 0

PpY: 12

Finance Solver info st

2 marks

d. Payments = $179 \times 1800 + 1 \times (1800 - 1517.50) = 322\,482.50$
Interest = $322\,482.50 - 210\,000 = \$112\,482.50$

Finance Solver

N: 180

I(%): 6.2

PV: -210000

Pmt: 1800

FV: -1517.5049331391

PpY: 12

3 marks
Total 9 marks

Question 2

a. $V_0 = 922\,500$, $V_{n+1} = 1.004V_n - 4800$

2 marks

b.

<i>Payment number</i>	<i>Payment</i>	<i>Interest</i>	<i>Principal reduction</i>	<i>Balance of the annuity</i>
0	-	-	-	922 500.00
1	4800	3690.00	1110.00	921 390.00
2	4800	3685.56	1114.44	920 275.56

$$\text{Interest} = \frac{4.8}{1200} \times 921390 = 3685.56$$

(1 mark)

$$\text{Principal reduction} = 4800 - 3685.56 = 1114.44$$

(1 mark)

$$\text{Balance} = 921390 - 1114.44 = 920275.56$$

(1 mark)

3 marks

c.

Finance Solver	
N:	36
I(%):	4.8
PV:	-922500
Pmt:	4800
FV:	879611.6996103
PpY:	12

$$\text{Balance} = \$879\,611.70$$

2 marks

- d. Balance after 10 years = \$751 968.53

Finance Solver	
N:	120
I(%):	4.8
PV:	-922500
Pmt:	4800
FV:	751968.52549845
PpY:	12

Balance after 15 years = \$583 350.85

Finance Solver	
N:	60
I(%):	4.8
PV:	-751968.53
Pmt:	5500
FV:	583350.8451808
PpY:	12

1 mark

- e. \$3690

Finance Solver	
N:	1
I(%):	4.8
PV:	-922500
Pmt:	3690
FV:	922500
PpY:	12

Finance Solver info

2 marks

- f. Perpetuity

1 mark

Total 11 marks

END OF KEY TOPIC TEST SOLUTIONS