GENERAL MATHEMATICS 2024

Unit 3
Key Topic Test 6 – Recursion and Financial Modelling: Compound Interest Investment and Loans

Recommended writing time*: 45 minutes
Total number of marks available: 25 marks

SOLUTIONS

SECTION A – Multiple Choice (1 mark per question)

Question 1
Answer: B

$280000\left(1+\frac{4.2}{1200}\right)^{60}$
$= \$345\ 303$

Question 2
Answer: A

$Int = 25000\left(1+\frac{12.2}{400}\right)^{12} - 25000$
$= \$10\ 852.21$

Question 3
Answer: D

$6241.76 = P\left(1+\frac{18.4}{1200}\right)^{12}$
$P = \$5200$

Question 4
Answer: B

$520000(1.008)^{48}$
$= \$762\ 270.10$

Question 5
Answer: C

$\left(1+\frac{r}{1200}\right) = 1.008$
$r = 9.6\%$

SECTION B – Short Answer

Question 1

a. $V_0 = 20\,000,\ V_{n+1} = 1.0105V_n$

2 marks

b. $V_{12} = 20000(1.0105)^{12}$

$= \$22\,670.75$

1 mark

c. $V_{24} = 20000(1.0105)^{24}$

$= \$25\,968.14$

1 mark

d. $25\,968.14 - 20000$
$= \$5968.14$

1 mark

Total 5 marks

Question 2

a. $V_0 = 36\,000,\ V_{n+1} = 1.02V_n$

2 marks

b. $V_{20} = 36000(1.02)^{20}$
$= \$53\,494.11$

1 mark

c. $70000 < 36000(1.02)^t$
$t = 34$ years

2 marks

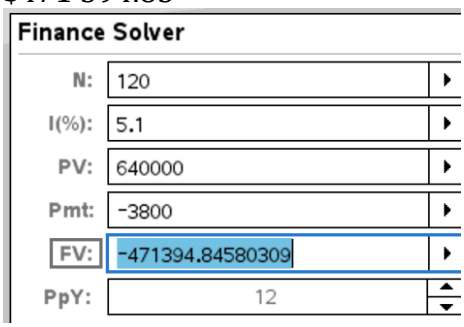
Total 5 marks

Question 3

a. $V_0 = 640\,000,\ V_{n+1} = 1.00425V_n - 3800$

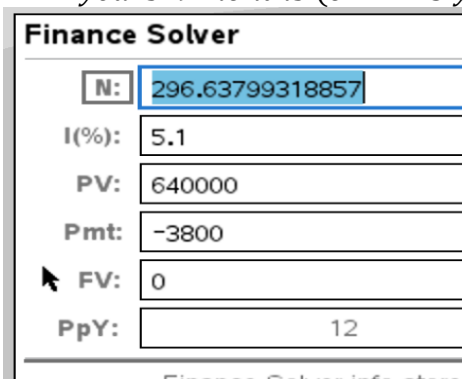
2 marks

b. \$471 394.85



1 mark

c. 297 months
$= 24\ years\ \ 9\ months\ (or\ 24.75\ years)$



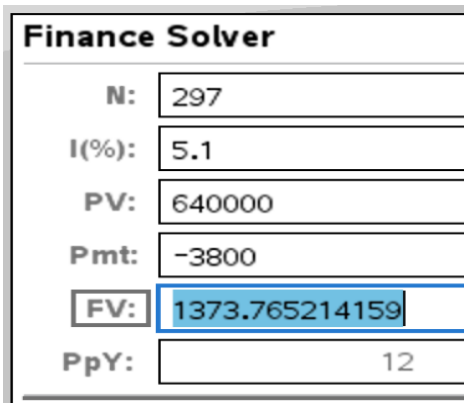
2 marks

d. Final payment $= 3800 - 1373.77$
$=$ \$2426.23

Total payment = $296 \times 3800 + 2426.23$
$=$ \$1 127 226.23

Interest = \$487 226

2 marks



Total 7 marks

Question 4 (3 marks)

Initial value $= V_0$

After 1 year, $V_0\left(1+\frac{i}{400}\right)^4 = 56369.50$ (1)

After 2 years, $V_0\left(1+\frac{i}{400}\right)^8 = 66198.34$ (2)

Dividing equation (1) by equation (2) gives

$$\left(1+\frac{i}{400}\right)^4 = 1.174364506$$
$$1+\frac{i}{400} = 1.041$$
$$\frac{i}{400} = 0.041$$
$$i = 4.1$$ (2 marks)

Using $V_0\left(1+\frac{i}{400}\right)^4 = 56369.50$

$$V_0(1.04)^4 = 56369.50$$

$$V_0 = \frac{56369.50}{(1.04)^4}$$
$$= \$48185$$ (1 mark)

3 marks

END OF KEY TOPIC TEST SOLUTIONS