IEB Finance, growth and decay practice — Memorandum

Every answer below was confirmed by an independent verifier at the moment the question was made.

Borrowing: the present-value annuity

1

(a) Answer: R15 191.75

1. $i = 11\%/12$ and $n = 300$
2. $1550000 = x\frac{1-(1+0.009167)^{-300}}{0.009167}$
3. $x = \text{R}15\ 191.75$

(b) Answer: R798 136.43

1. after 228 payments
2. balance $= 1550000(1+i)^{228} - 15191.75\frac{(1+i)^{228}-1}{i}$
3. $= \text{R}798\ 136.43$

(c) Answer: 11.57%

1. $1 + i\_\text{eff} = (1+\frac{0.11}{12})^{12}$
2. $i\_\text{eff} = 11.57\%$

(d) Answer: 121 payments

1. $1550000 = 21300\frac{1-(1+i)^{-n}}{i}$
2. $(1+i)^{-n} = 0.332942$
3. $n = 120.53$
4. 121 payments

Saving: the future-value annuity

2

(a) Answer: R324 821.08

1. after 36 payments: $2800\frac{(1+i)^{36}-1}{i} = \mathrm{R}115\ 227.61$
2. after 36 more: $\mathrm{R}115\ 227.61(1+i)^{36} + 1850\frac{(1+i)^{36}-1}{i} = \mathrm{R}226\ 924.60$
3. left to grow 48 months: $\mathrm{R}226\ 924.60(1+i)^{48}$
4. $= \mathrm{R}324\ 821.08$

(b) Answer: R206 005.66

1. deposits at 6, 12, ..., 60 months: 10 of them
2. $\mathrm{FV} = 16000\frac{(1+0.055)^{10}-1}{0.055}$
3. $= \mathrm{R}206\ 005.66$

3

(a) Answer: R5 271.37

1. $i = 7\%/12$ and $n = 72$
2. $470000 = x\frac{(1+i)^{72}-1}{i}$
3. $x = \mathrm{R}5\ 271.37$

(b) Answer: 116 months

1. $240000(1+i)^n \geq 470000$
2. $n \geq \frac{\log(470000/240000)}{\log(1+i)} = 115.55$
3. 116 months

(c) Answer: R436 154.08

1. $240000(1+i)^{72} + 800\frac{(1+i)^{72}-1}{i}$
2. $= \mathrm{R}436\ 154.08$

Compound growth

4

(a) Answer: R3 934 164.62

1. $\mathrm{A} = 2450000(1 + 0.07)^{7}$
2. $= \mathrm{R}3\ 934\ 164.62$

(b) Answer: 2020

1. $2450000(1 + 0.07)^{n} > 3.675e{+}06$
2. $(1 + 0.07)^{n} > 1.5$
3. $n > \frac{\log 1.5}{\log 1.07} = 5.99$
4. $n = 6$, so $2014 + 6 = 2020$

(c) Answer: R80 000.00

1. $\mathrm{A} = 400000(1 - 4 \times 0.2)$
2. $= \mathrm{R}80\ 000.00$

(d) Answer: R83 840.00

1. $\mathrm{A} = 400000(1 - 0.2)^{4} = \mathrm{R}163\ 840.00$
2. $\mathrm{R}163\ 840.00 - \mathrm{R}80\ 000.00 = \mathrm{R}83\ 840.00$

Depreciation

5

(a) Answer: R1 613 285.13

1. $\mathrm{A} = 1075000(1 + 0.07)^{6}$
2. $= \mathrm{R}1\ 613\ 285.13$

(b) Answer: R191 326.90

1. $\mathrm{A} = 1075000(1 - 0.25)^{6}$
2. $= \mathrm{R}191\ 326.90$

(c) Answer: R15 451.81

1. the fund must reach $\mathrm{R}1\ 613\ 285.13 - \mathrm{R}191\ 326.90 = \mathrm{R}1\ 421\ 958.23$
2. $1421958.23 = x\frac{(1 + 0.006667)^{72} - 1}{0.006667}$
3. $x = \mathrm{R}15\ 451.81$

(d) Answer: 17.58% per annum

1. $337000 = 1075000(1 - i)^{6}$
2. $1 - i = (\frac{337000}{1075000})^{1/6}$
3. $i = 17.58\%$

Nominal and effective rates

6

(a) Answer: 10.50%

1. $1 + 0.1102 = (1 + \frac{i}{12})^{12}$
2. $i = 12[(1 + 0.1102)^{1/12} - 1]$
3. $i = 10.50\%$

(b) Answer: R1 639 811.48

1. $i = 10.50\%/12$ and $n = 360$
2. $\text{PV} = 15000\frac{1 - (1 + i)^{-360}}{i}$
3. $= \text{R1 639 811.48}$

(c) Answer: R250 188.52

1. deposit $= \text{R1 890 000} - \text{R1 639 811.48}$
2. $= \text{R250 188.52}$

(d) Answer: R1 101 466.85

1. after 228 payments: $\text{R1 639 811.48}(1 + i)^{228} - 15000\frac{(1 + i)^{228} - 1}{i} = \text{R1 171 466.85}$
2. $\text{R1 171 466.85} - \text{R70 000} = \text{R1 101 466.85}$

(e) Answer: 119 payments

1. $1101466.85 = 15000\frac{1 - (1 + i)^{-n}}{i}$
2. $n = 118.08$
3. 119 payments