Time payments (1)

QUESTION **1** Find the value of M, giving the answer correct to two decimal places:

a $M = \dfrac{80\,000(1.03)^{12}(0.03)}{1.03^{12} - 1}$

b $M = \dfrac{150\,000(1.005)^{240}(0.005)}{1.005^{240} - 1}$

QUESTION **2** Assume A_n is the amount owing on a loan at the end of n months.

a If a loan is to be repaid with equal monthly instalments over five years write down the value of A_{60} briefly justifying your answer.

b If $A_{60} = \$20\,000(1.007)^{60} - M\left(\dfrac{1.007^{60} - 1}{0.007}\right)$ find the value of M, to the nearest cent.

QUESTION **3** Use the formula for the sum of a geometric series to simplify

$1 + 1.004 + 1.004^2 + 1.004^3 + \ldots + 1.004^{n-1}$

Series and applications

Time payments (2)

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QUESTION **1** Steven borrows \$120 000. Compound interest of 0.5% per month is charged monthly and repays an amount of \$$M$ every month. If A_n is the amount owing at the end of n months:

a Write down an expression for A_1

b Show that $A_2 = \$[120\,000(1.005)^2 - M(1 + 1.005)]$

c Show that $A_3 = \$[120\,000(1.005)^3 - M(1 + 1.005 + 1.005^2)]$

d Write down a similar expression for A_n

e Show that $A_n = \$\left[120\,000(1.005)^n - M\left(\frac{1.005^n - 1}{0.005}\right)\right]$

f Find M, to the nearest whole number, if $A_{144} = 0$

Time payments (3)

QUESTION **1** Gabi invested an amount of \$40 000 in an account that earns 6.5% p.a. interest compounded annually. Gabi intends to withdraw \$$Y$ from the account at the end of each year, immediately after the interest has been paid. If A_n is the amount in the account immediately after the nth withdrawal:

a Write an expression for A_1

b Show that $A_{10} = \$\left[40\,000(1.065)^{10} - Y\left(\dfrac{1.065^{10} - 1}{0.065}\right)\right]$

c If the account is empty immediately after the 10^{th} withdrawal, find the value of Y

Series and applications

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Time payments (4)

QUESTION **1** What are the monthly repayments on a loan of $75 000 over 20 years at an interest rate of 0.7% per month compound interest?

Page 165 **1** **a** 8036.97 **b** 1074.65 **2** **a** $A_{60} = 0$. The loan will be repaid after 5 years (60 months), so the amount owing at that time will be zero. **b** \$409.37 **3** $\frac{1.004^n - 1}{0.004}$

Page 166 **1** **a** $\$120\,000(1.005) - M$ **d** $\$[120\,000(1.005)^n - M(1 + 1.005 + 1.005^2 + \ldots + 1.005^{n-1}]$ **f** 1171

Page 167 **1** **a** $\$40\,000(1.065) - Y$ **c** 5564

Page 168 **1** \$646.13