

NAME:



Centre of Excellence in Mathematics
S201 / 414 GARDENERS RD. ROSEBERY 2018
www.cemtuition.com.au

MOBILE 0412880475



PHONE 096666111

YEAR 12 – ADVANCED MATHS

REVIEW TOPIC (SP4)

FINANCE MATHS

PAST HSC EXAMINATION QUESTIONS: (* indicates difficult questions)**HSC '99**

(7)(a) Isabella invests $\$P$ at 8% per annum compounded annually. She intends to withdraw $\$3000$ at the end of each of the next six years to cover school fees. 5

- (i) Write down an expression for the amount $\$A_1$ remaining in the account following the withdrawal of the first $\$3000$.

$$1.08P - 3000$$

- (ii) Find an expression for the amount $\$A_2$ remaining in the account after the second withdrawal.

$$(1.08)^2P - 3000(1.08 + 1)$$

- (iii) Calculate the amount $\$P$ that Isabella needs to invest if the account balance is to be $\$0$ at the end of six years

$\$13868.64$

***HSC '98**

(10) A fish farmer began business on 1 January 1998 with a stock of 100 000 fish. He had a contract to supply 15 400 fish at a price of \$10 per fish to a retailer in December each year. In the period between January and the harvest in December each year, the number of fish increases by 10%. 7

(i) Find the number of fish just after the second harvest in December 1999.

88 660 fish

(ii) Show that F_n , the number of fish just after the n th harvest, is given by

$$F_n = 154\,000 - 54\,000(1.1)^n.$$

(iii) When will the farmer have sold all his fish, and what will his total income be ?

11 years, \$1 694 000

(iv) Each December the retailer offers to buy the farmer's business by paying \$15 per fish for his entire stock. When should the farmer sell to maximise his total income ?

7th year

HSC '95

(8)(a) On 1 July 1985, Anna invested \$10 000 in a bank account that paid interest at a fixed rate of 8% per annum, compounded annually. 4

- (i) How much would be in the account after the payment of interest on 1 July 1995 if no additional deposits were made ?

\$21 589.25

- (ii) In fact, Anna added \$1 000 to her account on 1 July each year, beginning on 1 July 1986.

How much was in her account on 1 July 1995 after the payment of interest and her deposit ?

\$36 075.81

- (iii) Anna's friend, Jennifer, invested \$10 000 in an account at another bank on 1 July 1985 and made no further deposits. On 1 July 1995, the balance of Jennifer's account was \$35 478.

What was the annual rate of compound interest paid on Jennifer's account?

HSC '94

- (1) (f) Kim invested \$1000 at 8 % per year compound interest, compounded quarterly. Calculate the value of the investment after 5 years.

\$1485.95

HSC '93

- (1) Ezzat invests \$50 000 in an account which earns 8% interest, compounded annually. He intends to withdraw \$ M at the end of each year, immediately after the interest has been paid. He wishes to be able to do this for exactly 20 years, so that the account will then be empty.
- (a) How much money does he have in the account immediately after he has made his first withdrawal ?

\$54 000 – M

- (b) Write an expression in terms of M for the amount of money in the account, immediately after his 20th withdrawal.

$\$50\,000 \times 1.08^{20} - \frac{M(1.08^{20} - 1)}{0.08} = 233047.86 - 45.76M$

(c) Calculate the value of M which leaves his account empty after the 20th withdrawal.

(d) Suppose Ezzat wished to be able to withdraw \$8000 per year for the 20 years. By using your calculator alone, estimate, to the nearest per cent, the interest rate he would then need to earn on his account

(c) \$5092.61 (d) 15%

HSC '91

(2) Benjamin Franklin left a will in which he established a fund of \$1000 for the citizens of Boston. His instructions were that his money was to be invested at 5% interest, compounded annually.

- (i) If Franklin's instructions were followed, how much money would have been in the fund 100 years after it was established ?

\$131501.26

- (ii) Suppose that at the beginning of each subsequent year after establishment, a further \$1000 had been added to the fund and had also earned 5% interest, compounded annually.

How much money would have been in the fund after 200 years, just before the next \$1 000 would have been added to the fund ?

\$363 123 197

HSC '90

- (3) A farmer borrows \$80 000 to purchase new machinery. The interest is calculated monthly at the rate 2 % per month, and is compounded each month.

The farmer intends to repay the loan with interest in two equal annual instalments of \$ M at the end of the first and second years.

- (a) How much does the farmer owe at the end of the first month ?

\$81600

- (b) Write an expression involving M for the total amount owed by the farmer after 12 months, just after the first instalment of \$ M has been paid.

$\$80\,000(1.02)^{12} - M$

HSC'87

(4) A person invests \$800 at the beginning of each year in a superannuation fund. Compound interest is paid at 10 % per annum on the investment. The first \$800 is to be invested at the beginning of 1988 and the last is to be invested at the beginning of 2017. Calculate to the nearest dollar :

(a) the amount to which the 1988 investment will have grown by the beginning of 2018;

\$13960

(b) the amount to which the total investment will have grown by the beginning of 2018.

\$144755

HSC '84

(5) On 1st January 1957, a person joins a superannuation fund by investing \$3000 at 9% per annum compound interest. A similar amount is invested at the beginning of each subsequent year until the person retires on 31st December 1984.

(a) Show that the accumulated value of the investment at the date of retirement is \$369 406 correct to the nearest dollar.

(b) If this amount is taken as a lump sum payment, which is taxable at the rate of 30 cents in every dollar in excess of \$50 000, then how much does the person receive after tax ?

\$273584.20