Homework 27-10

2U: Finance

1. Complete the grind section of Loan Repayments and Annuities
2. Complete the below HSC questions:

(a) On the day that Megan was born, her grandfather deposited \$5000 into an account earning 3% per annum compounded annually. On each birthday after this, her grandfather deposited \$1000 into the same account, making his final deposit on Megan's 17th birthday. That is, a total of 18 deposits were made. **2**

Let A_n be the amount in the account on Megan's nth birthday, after the deposit is made.

Show that $A_3 = \$8554.54$.

(b) On her 17th birthday, just after the final deposit is made, Megan has \$30 025.83 in her account. You are NOT required to show this. **3**

Megan then decides to leave all the money in the same account continuing to earn interest at 3% per annum compounded annually. On her 18th birthday, and on each birthday after this, Megan withdraws \$2000 from the account.

How many withdrawals of \$2000 will Megan be able to make?

(a) A person wins \$1 000 000 in a competition and decides to invest this money in an account that earns interest at 6% per annum compounded quarterly. The person decides to withdraw \$80 000 from this account at the end of every fourth quarter. Let A_n be the amount remaining in the account after the nth withdrawal.

(i) Show that the amount remaining in the account after the withdrawal at the end of the eighth quarter is **2**

$$A_2 = 1\,000\,000 \times 1.015^8 - 80\,000\left(1 + 1.015^4\right).$$

(ii) For how many years can the full amount of \$80 000 be withdrawn? **3**

(c) Sam borrows \$100 000 to be repaid at a reducible interest rate of 0.6% per month. Let $\$A_n$ be the amount owing at the end of n months and $\$M$ be the monthly repayment.

(i) Show that $A_2 = 100\,000(1.006)^2 - M(1+1.006)$. **1**

(ii) Show that $A_n = 100\,000(1.006)^n - M\left(\frac{(1.006)^n - 1}{0.006}\right)$. **2**

(iii) Sam makes monthly repayments of \$780. **1**

Show that after making 120 monthly repayments the amount owing is \$68 500 to the nearest \$100.

(iv) Immediately after making the 120th repayment, Sam makes a one-off payment, reducing the amount owing to \$48 500. The interest rate and monthly repayment remain unchanged. **3**

After how many more months will the amount owing be completely repaid?

3U: Trigonometry

1. Complete the grind section.
2. Complete the homework quiz! Use it as a study resource. Next week, we will be doing a topic test and revision.