1. A perpetuity pays 1 at the end of every year plus an additional 1 at the end of every second year. The present value of the perpetuity is $K$ for $i \geq 0$. Determine $K$ in terms of $i$ (simplify!)

2. Annual deposits of 10 are made into a fund for 20 years. 21 years after the last deposit, payment of $X$ is made from the fund. This payment is repeated annually forever. Find the annual interest rate, if $X = 258$.

3. A person deposits 100 at the beginning of each year for 20 years. Simple interest at an annual rate of $i$ is credited to each deposit from the date of deposit, to the end of 20-year period. The total amount thus accumulated (at the end of 20-year period) is 2840. If instead, compound interest had been credited at an effective annual rate of $i$, what would the accumulated value of these deposits have been at the end of 20 years?

4. I borrow 500 from the bank at time 0, at an interest rate of 0.10 per annum effective. I am to repay the loan by $n - 1$ annual installments of $X$, followed by a drop payment at time $n$ of less then $X$.

(a) If $X = 80$, find $n$ and the value of the drop payment.

(b) What happens if $X = 30$? What is the smallest possible value of $X$?

5. A sum, $P$, is used to buy a deferred perpetuity-due of 1 payable annually. The effective annual rate of interest is $i, i > 0$. Calculate the deferred period. Show work!

(A) $\ln\left(\frac{P}{d}\right)$ (B) $1 - \frac{\ln(iP)}{\delta}$ (C) $-\frac{\ln(iP)}{\delta}$ (D) $1 + \frac{\ln(dp)}{\delta}$ (E) $\frac{\ln(dp)}{\delta}$.