1. **(CA)** When we work with annuities, we use a specific form of the sum of a *geometric sequence formula.*

   - Recall that the general form for the sums of any geometric series is $S_n = \frac{u_1(r^n - 1)}{r - 1}$
   - When we are building up the money, we may use the FV equation.
     $FV_{annuity} = C * \left[\frac{(1+i)^n - 1}{i}\right]$ Where: C = the payment per period, i = interest rate per period, and n = number of periods.
   - When we are withdrawing money in retirement, we may use the PV equation
     $PV_{annuity\ due} = C * \left[\frac{1 - (1+i)^{-n}}{i}\right] * (1 + i)$ Where C = the withdrawal per period, i = interest rate per period, and n = number of periods.

   I am going to invest money in an account with 5% p.a. compounded monthly. When I turn 60 I want to retire and start withdrawing $4,000 per month for 20 years.

   a. How much money should I have saved up on the day I retire, in order to fund my 20 years of retirement?
   b. I will start putting a fixed amount of money each month into a retirement account which will earn interest of 5% p.a. compounded monthly. I will begin this process at the age of 30, so I will do this each month for 30 years. How much must I invest each month to achieve this goal?

2. **(CA)** A pyramid has a square base and a height of 60m.

   a. If the volume of the pyramid is 100,000 cubic meters, what is the length of a side of the base?
   b. A sphere has the same volume as the pyramid, what is the surface area of that sphere?

3. **(CI)** Find the exact value of $2log_3 27 + log_3(\frac{1}{3}) - log_3 \sqrt{3}$

4. **(CI)** Let $P(C) = 0.4,\ P(D) = 0.5,\ P(C|D) = 0.6.$

   a. Find $P(C \cap D)$.
   b. Are C and D mutually exclusive? Give a reason for your answer.
   c. Are C and D independent events? Give a reason for your answer
   d. Find $P(C \cup D)$
   e. Find $P(D|C)$

5. **(CA)** Consider the geometric series $800 + 200 + 50 + ...$

   a. Determine the 10th term.
   b. Find the value of S_{10}.
   c. Find the sum to infinity

6. **(CI)** Solve on the domain $-360° \leq x \leq 360°$

   a. $6 \sin (x) - 2 = 1$
   b. $\sqrt{3} \tan (x) = 1$
   c. $2 \cos (x) + \sqrt{3} = 0$

7. **(CI)** For each of the following functions, find the inverse:

   a. $f(x) = \frac{3x+17}{2}$
   b. $g(x) = 2x^3 + 3$
   c. $h(x) = -\frac{1}{5}x^2 + 1$

8. **(CI)** Given the function $f(x) = \frac{2x-5}{x+2}; x \neq -2$.

   a. Write down the equations of the asymptotes
   b. Writedown the coordinates of the intercepts with both axes.
   c. Sketch the function
   d. Determine the equation of $f^{-1}(x)$.