



RAFFLES INSTITUTION
H2 Mathematics (9758)
2025 Year 5

Additional Practice Questions for Chapter 7A: Sequences and Series

- 1** Evaluate the following sum.

(a) $\sum_{r=-n}^{n-1} (3r+5)$ (b) $\sum_{r=n+1}^{2n} (r+n)(r-1)$ (c) $\sum_{r=-1}^{11} (r2^r)$

[You may use the result $\sum_{r=1}^n r = \frac{n}{2}(n+1)$ and $\sum_{r=1}^n r^2 = \frac{1}{6}n(n+1)(2n+1)$]

- 2** Given that $\sum_{r=1}^n r^2 = \frac{n}{6}(n+1)(2n+1)$, find, in terms of a , $\sum_{r=37}^a (2r)^2$, where a is an integer and $a \geq 37$. [3]

- 3** Given that $\sum_{r=1}^n r = \frac{n}{2}(n+1)$ and $\sum_{r=1}^n r^2 = \frac{1}{6}n(n+1)(2n+1)$, show that $\sum_{r=1}^n 3r(r-1) = n^3 - n$. [3]

Hence find $\sum_{r=n+1}^{2n} [n(r+1) - 3r(r-1)]$, simplifying your answer. [3]

- 4** Using $\sum_{r=1}^n r = \frac{n}{2}(n+1)$, find $\sum_{r=50}^{100} \ln[2(3^r)]$, leaving your answer in the form $A \ln 2 + B \ln 3$, where A and B are constants to be found. [5]

- 5 (a)** The sum, S_n , of the first n terms of a sequence $u_1, u_2, u_3, \dots$ is given by

$$S_n = 75 - \frac{3^{n+1}}{5^{n-2}}.$$

Show that $u_n = k\left(\frac{3}{5}\right)^{n-1}$, where k is a constant to be determined. Find S_∞ . [4]

- (b)** Another sequence of numbers $v_1, v_2, v_3, \dots$ is such that $\sum_{i=1}^n v_i = \frac{2n}{2n+1}$.

Find the exact value of $\sum_{i=11}^{\infty} v_i$. [3]

- 6 During a clinical trial, the concentration U , of a specific blood agent is measured at one-hour intervals following the initial administration of the trial drug to a patient.

The following readings were obtained

$$U_3 = 88, U_4 = 76 \text{ and } U_5 = 70,$$

where U_t denotes the reading t hours after the drug was first administered.

It is believed that U satisfies the relationship

$$U_{t+1} = p + qU_t, t \geq 0,$$

where p and q are constants.

- (a) Find the values of p and q . [2]
- (b) Determine the initial concentration of the blood agent when the drug was initially administered. [3]
- (c) Describe how the concentration behaves over a long period of time. [1]

THE END