# Sequences and series - Practice test 2

Name: _____ Date: _____

10 questions | 56 marks | 70 minutes

Comparing rules, timing and proof structure.

A scientific calculator may be used.

**1.** Two lists are $A: 2, 5, 8, 11, \ldots$ and $B: 2, 6, 18, 54, \ldots$. [5 marks]

**(a)** Classify each and give its explicit rule. [3 marks]

**(b)** Find the fourth-term sum for each. [2 marks]

**2.** An arithmetic sequence has $u_3 = 11, u_8 = 31$. [5 marks]

**(a)** Find its rule. [2 marks]

**(b)** Find the first term greater than 100 and its index. [3 marks]

**3.** Four arithmetic means are inserted between 7 and 32. [4 marks]

**(a)** Find the means. [2 marks]

**(b)** Find the sum of all six terms. [2 marks]

**4.** A positive geometric sequence has $u_2 = 12, u_5 = 96$. [5 marks]

**(a)** Find $a$ and $r$. [2 marks]

**(b)** Find the sum of its first five terms. [3 marks]

**5.** Consider $4-2+1-\frac{1}{2}+\cdots$. [6 marks]

**(a)** Find its first six-term sum. [3 marks]

**(b)** Find the infinite sum and compare it with the six-term sum. [3 marks]

**6.** The geometric series $1+\frac{1}{3}+\frac{1}{9}+\cdots$ is approximated by its first $n$ terms. [6 marks]

**(a)** Find its infinite sum and tail after $n$ terms. [3 marks]

**(b)** Find the least $n$ for a tail below 0.001. [3 marks]

**7.** A debt is AUD 1500 initially. Each month 2% interest is added, then AUD 200 is paid. [6 marks]

**(a)** Calculate the first two updated balances. [2 marks]

**(b)** Find a closed formula valid before the debt is repaid. [4 marks]

**8.** A painter covers 6 square metres on day 1 and 2 extra square metres each later day. [6 marks]

**(a)** Write the total area after $n$ days. [3 marks]

**(b)** Find the first day by which the total exceeds 100 square metres. [3 marks]

**9.** For fixed real $a, d$, let $S_n = a + (a+d) + \cdots + [a + (n-1)d]$. [7 marks]

**(a)** State the arithmetic-sum identity and check $n = 1$. [2 marks]

**(b)** Prove the identity by induction. [5 marks]

**10.** An account begins at AUD 500. Compare model $A_{n+1} = 1.1A_n + 50$ with model $C_{n+1} = 1.1(C_n + 50)$. [6 marks]

**(a)** Explain the timing difference. [2 marks]

**(b)** Find both balances after two periods and their difference. [4 marks]