

1.12 Classwork: Series; due Tuesday 28 October

1. Given a geometric sequence with $u_1 = 9$ and $r = \frac{4}{3}$

(a) Find u_8 .

$$u_8 = 9 \cdot \left(\frac{4}{3}\right)^{8-1} = \frac{16384}{243} = 67.4239... \approx 67.4 \quad [2 \text{ marks}]$$

(b) Find S_8 , the sum of the first eight terms of the sequence.

$$S_8 = 9 \cdot \frac{\left(\frac{4}{3}\right)^8 - 1}{\frac{4}{3} - 1} = \frac{58975}{243} = 242.695... \approx 243 \quad [2]$$

(c) $S_k \approx 825.37$. Find k algebraically.

$$S_k = \frac{9 \cdot \left(\frac{4}{3}\right)^k - 9}{\frac{4}{3} - 1} \approx 825.37 \quad \left(\frac{4}{3}\right)^k = \frac{276.123...}{9} \approx 30.68 \quad k = \log_{\frac{4}{3}} \left(\frac{276.123}{9}\right) \approx 11.9 \approx 12$$

2. Three consecutive terms of a geometric sequence are $x - 2$, 6 , and $x + 7$.

Find the possible values of x .

$$r = \frac{6}{x-2} = \frac{x+7}{6}$$

$$x^2 + 5x - 14 = 36$$

$$x^2 + 5x - 50 = 0$$

$$(x+10)(x-5) = 0$$

$$x = -10, 5$$

check
-10: $-12, 6, -3$ ✓ $r = -\frac{1}{2}$
5: $3, 6, 12$ ✓ $r = 2$

3. Find the value of each of the following, as an integer. (no calculator)

(a) $\log_6 36 = 2$

(b) $\log_6 4 + \log_6 9 = \log_6 (4 \cdot 9) = 2$

(c) $\log_6 2 - \log_6 12 = \log_6 \left(\frac{2}{12}\right) = -1$

4. Solve $\log_2 x + \log_2 (x - 2) = 3$, for $x > 2$.

$$\log_2 [x(x-2)] = 3$$

$$x^2 - 2x = 8$$

$$(x-4)(x+2) = 0$$

$$x = 4$$

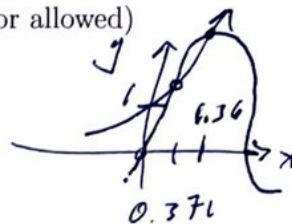
(disregard $x = -2$)

check
 $\log_2 (4) + \log_2 (4-2) = 2 + 1 = 3$ ✓

5. Solve the equation $e^x = 4 \sin x$, for $0 \leq x \leq 2\pi$. (calculator allowed)

n Solve ($e^x = 4 \sin(x)$, x)

$x = 0.370558, \dots$
 $\approx 0.371, 1.36$



[5]

6. The expression $(x+a)(x+b)$ can not be written as

(a) $a(x+b) + x(x+b)$

(b) $x^2 + (a+b)x + ab$

(c) $x^2 + abx + ab$

(d) $x(x+a) + b(x+a)$

7. Graph $y = 400(.85)^{2x} - 6$ on the set of axes below.

