

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

- (b) Find S_8 , the sum of the first eight terms of the sequence. [2]

$$S_8 = 9 \cdot \frac{\left(\frac{4}{3}\right)^8 - 1}{\frac{4}{3} - 1} = \frac{58975}{243} = 242.695\ldots \approx 243$$

- (c) $S_k \approx 825.37$. Find k algebraically. [2]

$$S_k = \frac{\left(\frac{4}{3}\right)^k - 1}{\frac{4}{3} - 1} \approx 825.37 \quad \left(\frac{4}{3}\right)^k = \frac{276.123\ldots}{9} \quad 11.9\ldots \approx 12 \\ k = \log_{\left(\frac{4}{3}\right)} \left(\frac{276.123}{9} \right) = \frac{11.9\ldots}{\log\left(\frac{4}{3}\right)} \approx \cancel{11.9\ldots} \quad (\text{check})$$

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

Find the possible values of x .

$$r = \frac{6}{x-2} = \frac{x+7}{6} \quad x^2 + 5x - 50 = 0 \quad \begin{array}{l} \text{check} \\ -10, -6, -3 \end{array} \quad r = -\frac{1}{2}$$

$$x^2 + 5x - 14 = 36 \quad x = -10, 5 \quad 5: 3, 6, 12 \quad r = 2$$

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

(a) $\log_6 36 = 2$

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

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

[3]

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

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

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

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

$$x = 4 \quad (\text{disregard } x = -2)$$

check
 $\log_2(4) + \log_2(4-2) = ?$

$$2 + 1 = 3 \quad \checkmark$$

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,..
≈ 0.371 , 1.36*

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.

