

Name:

**Sequences & series**

1. The first three terms of a geometric sequence are  $u_1 = 1.2$ ,  $u_2 = 3$ , and  $u_3 = 7.5$ .

(a) Find the value of  $r$ .

[2]

(b) Find the value of  $S_6$ .

[2]

(c) Find the least value of  $n$  such that  $S_n > 300$ .

[3]

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

[6]

3. Find the value of each of the following, giving your answer as an integer.

(a)  $\log_6 36$ .

[2]

(b)  $\log_6 4 + \log_6 9$ .

[2]

(c)  $\log_6 2 - \log_6 12$ .

[3]

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

[7]

5. Let  $f(x) = e^{x+3}$ .

(a) i. Show that  $f^{-1}(x) = \ln x - 3$ .

[3]

ii. Write down the domain of  $f^{-1}$ .

(b) Solve the equation  $f^{-1}(x) = \ln \frac{1}{x}$ .

[4]

6. Solve the equation  $e^x = 4 \sin x$ , for  $0 \leq x \leq 2\pi$ .

[5]