

SEF041 Mathematics B - Semester 1

- TUTORIAL SHEET 1: covers material from WEEK 1

Please try these questions before your tutorial class, so that you can profit from the tutorial to resolve any difficulties that you have!

1. Simplify

$$\frac{\sqrt[6]{a^{24}}}{a^3 a^2 \sqrt[3]{a^9}}$$

2. Find x by recognition

(a) $100^x = 1000000$

(b) $(-3)^x = -27$

(c) $\frac{1}{3^{-4x}} = 81$

3. Express the following as logarithms to base 10 and hence calculate their values by using log on the calculator:

(a) $\log_2 100$

(b) $\log_{0.1} 100$

(c) $\log_{1000} 100$

4. Simplify the following expressions:

(a) $\frac{\log_2 x}{\log_3 x^2}$

(b) $\log_2 3 \times \log_3 2$

(c) $\frac{1}{2} \log_4 x - \frac{1}{4} \log_2 x$

(d) $\frac{\log_2 3}{\log_2 6} (\log_2 x + \log_3 x)$

5. Simplify

(a)

$$\log_3 x + \log_9 x$$

(b)

$$\log_a x^2 + \ln x^3 + 6 \log_a x$$

for $\ln a = 3$.

6. Use your answers to Question 5 and solve the following equations:

(a) $\log_3 x + \log_9 x = 1$

(b)

$$\log_a x^2 + \ln x^3 + 6 \log_a x = 34$$

for $\ln a = 3$.

Give your answer in exact form before calculating it to 2 d.p. (decimal places).

7.

Find the one real value of x satisfying the equation:

$$3 \times 2^{2x} + 2^{x+1} - 1 = 0.$$

8.

Solve the following simultaneous equations:

$$\ln x + 2 \ln y = \ln 3 \quad (1)$$

$$\ln x + \ln y = 1. \quad (2)$$

[Hint: Start by subtracting the second equation from the first equation.]

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– **TUTORIAL SHEET 4:** covers material from **WEEK 1** Please try these questions before your tutorial class, so that you can profit from the tutorial to resolve any difficulties that you have!

9. Find x :

$$\log_2(x^2 - 6x) = 3 + \log_2(1 - x)$$

10. Solve the simultaneous equation:

$$\begin{aligned}\log_2 y &= \log_2 x + 4 \\ 8^y &= 4^{2x+3}\end{aligned}$$

11. Solve the following logarithmic equation:

$$16 \log_2 x + 4 \log_4 x + 2 \log_{16} x = 37$$

12. Prove

$$\log_5 6 + 2 \log_5 2 - \log_{25} 9 = 3 \log_5 2$$