

## Quiz 11

**Question 1.** (4 marks) Evaluate  $2024^{59}$  expressing your answer in scientific notation.

$$\text{LET } y = 2024^{59}$$

$$\log y = \log 2024^{59}$$

$$\log y = 59 \log 2024$$

$$\log y = 195.06642$$

$$y = 10^{195.06642}$$

$$= 10^{195} \cdot 10^{0.06642}$$

$$= 2024^{59} = 1.165 \times 10^{195}$$

**Question 2.** (6 marks) Solve for  $x$  (round to 3 decimal places):

(a)  $7^{3x+5} = 2 \cdot 5^x$

$$\ln 7^{3x+5} = \ln 2 \cdot 5^x$$

$$(3x+5) \ln 7 = \ln 2 + \ln 5^x$$

$$3x \ln 7 + 5 \ln 7 = \ln 2 + x \ln 5$$

$$3x \ln 7 - x \ln 5 = \ln 2 - 5 \ln 7$$

$$x(3 \ln 7 - \ln 5) = \ln 2 - 5 \ln 7$$

$$x = \frac{\ln 2 - 5 \ln 7}{3 \ln 7 - \ln 5}$$

$$= -2.137$$

(b)  $\frac{1}{2} \log(x-2) + \log 3 = 1$

$$\log(x-2)^{1/2} + \log 3 = \log 10$$

$$\log 3(x-2)^{1/2} = \log 10$$

$$3(x-2)^{1/2} = 10$$

$$(x-2)^{1/2} = \frac{10}{3}$$

$$x-2 = \left(\frac{10}{3}\right)^2$$

$$x = \left(\frac{10}{3}\right)^2 + 2$$

$$= \frac{118}{9} = 13.111$$