

Cambridge International AS & A Level

Mathematics

9709/32

Paper 3 Pure Mathematics 3

October/November 2024

Question No(4)

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Solve the equation $5^x = 5^{x+2} - 10$. Give your answer correct to 3 decimal places.

Solution:

$$\begin{aligned}
 5^x &= 5^{x+2} - 10 \\
 5^x &= 5^x \cdot 5^2 - 10 \\
 5^x &= 25 \cdot 5^x - 10 \\
 25 \cdot 5^x - 5^x - 10 &= 0 \\
 24 \cdot 5^x - 10 &= 0 \\
 24 \cdot 5^x &= 10 \\
 5^x &= \frac{10}{24} \\
 5^x &= \frac{5}{12} \\
 \ln(5^x) &= \ln\left(\frac{5}{12}\right) \\
 x \ln 5 &= \ln 5 - \ln 12 \\
 x &= \frac{\ln 5 - \ln 12}{\ln 5} \\
 x &= -0.544
 \end{aligned}$$