

Question 1

Solve the following equation for x :

$$3^{2x-1} = 7^{x+2}$$

Instructions: Solve algebraically using logarithms and express your answer in exact form. Approximate the result to 3 decimal places.

Question 1 - Solution

Taking natural logarithms (both sides are positive) gives

$$(2x - 1) \ln 3 = (x + 2) \ln 7.$$

Collect the terms in x and divide by their nonzero coefficient:

$$x = \frac{\ln 3 + 2 \ln 7}{2 \ln 3 - \ln 7} \approx 19.857.$$

The logarithm is one-to-one, so solving this equivalent linear equation introduces no extraneous solutions. The exact expression verifies the original equation.