

5.6.53

Exercise 5.6.53 Solve the exponential equation and express irrational solutions in exact form: $3^{1-2x} = 4^x$.

Solution

We take a logarithm to "get the variable out of the exponent." We may use any base logarithm, so we choose natural logarithms. We get

$$\ln(3^{1-2x}) = \ln(4^x) \text{ or, by Theorem 5.5.A(5),}$$

$$(1-2x)\ln(3) = x\ln(4) \text{ or}$$

$$\ln(3) - 2\ln(3)x - x\ln(4) = 0 \text{ or}$$

$$\ln(3) - x(2\ln(3) + \ln(4)) = 0 \text{ or}$$

$$x = \frac{\ln(3)}{2\ln(3) + \ln(4)}$$

□