

1 (10 pts). Solve for x :

$$2^{2x} - 17 \cdot 2^x + 72 = 0$$

Solution:

1. (Source: 5.3.more.2b,3.27)

$$2^{2x} - 17 \cdot 2^x + 72 = 0$$

$$(2^x - 8)(2^x - 9) = 0$$

$$2^x = 8 \text{ or } 2^x = 9$$

$$x = 3 \quad x = \log_2 9$$

(done)

If it helps, you can also make a substitution of variables in the equation. Note that 2^{2x} is the square of 2^x and let $u = 2^x$. The equation becomes $u^2 - 17u + 72 = 0$. (That's why we say that the original equation is "quadratic in 2^x .") Factor this quadratic to find the solutions $u = 8$ and $u = 9$. This becomes $2^x = 8$ and $2^x = 9$ as above.