1 (10 pts). Solve for $x$:

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

**Solution:**

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

\[
\begin{align*}
2^{2x} - 17 \cdot 2^x + 72 &= 0 \\
(2^x - 8)(2^x - 9) &= 0 \\
2^x &= 8 \text{ or } 2^x = 9 \\
x &= 3 \quad x = \log_2 9 \\
\end{align*}
\]

(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.