Solve the following equations. (Show at least one intermediate step for each.) Either leave the answer in exact form or round off to three decimal places.
$1 \log _{2}(x+7)+\log _{2}(x+8)=1$
I combine both sides into a single logarithm, then drop the logarithms:

$$
\begin{aligned}
\log _{2}(x+7)+\log _{2}(x+8) & =1 ; \\
\log _{2}[(x+7)(x+8)] & =\log _{2} 2 ; \\
(x+7)(x+8) & =2 ; \\
x^{2}+15 x+54 & =0 ; \\
x=-9 & \text { or } x=-6 .
\end{aligned}
$$

However, I must check for extraneous solutions; if $x=-9$, then $x+7$ or $x+8$ is negative, and I can't take a logarithm of a negative number. If $x=-6$, however, then $x+7$ and $x+8$ are both positive, so this solution should work. Therefore,

$$
x=-6 .
$$

$22^{x}=10$
To solve this, I take logarithms base 2 and break down the result:

$$
\begin{aligned}
2^{x} & =10 ; \\
\log _{2}\left(2^{x}\right) & =\log _{2} 10 ; \\
x \log _{2} 2 & =\log _{2}(2 \cdot 5) ; \\
x(1) & =\log _{2} 2+\log _{2} 5 ; \\
x & =1+\log _{2} 5 .
\end{aligned}
$$

To get a numerical approximation, I switch to a base that my calculator can handle:

$$
x=1+\log _{2} 5=1+\frac{\log 5}{\log 2} \approx 3.322 .
$$

