7. [4 points]
Find all possible solutions $w$ to the equation $\frac{2e^{9(w-1)}}{7} = 3$. Be sure to show all your steps, give your answer in exact form, and circle your final answer.

Solution: We can multiply both sides by $\frac{7}{2}$ to get

\[ e^{9(w-1)} = \frac{21}{2} \]

Taking $\ln$ of both sides then gives

\[ 9(w - 1) = \ln\left(\frac{21}{2}\right) = \ln(21) - \ln(2) \]

and solving for $w$, we get

\[ w = \frac{\ln(21) - \ln(2))}{9} + 1 \]

8. [5 points]
Consider the function

\[ R(q) = \frac{5q + 3}{4 - q} \]

Find a formula for its inverse. Be sure to show all your steps, and circle your final answer.

Solution: If we let $W = R(q)$, then we can set

\[ W = \frac{5q + 3}{4 - q} \]

Solving for $q$ in terms of $W$, we get

\[ W(4 - q) = 5q + 3 \]

Putting all the $q$ terms to the same side gives

\[ 5q + Wq = 4W - 3 \]

And using that $5q + Wq = q(5 + W)$, we divide to get

\[ q = \frac{4W - 3}{5 + W} \]

Hence our function for the inverse should be

\[ R^{-1}(W) = \frac{4W - 3}{5 + W} \]