8. [5 points] Let \( y = q(x) = \frac{ax}{1+ax} \), where \( a > 0 \) is a positive constant. Find a formula for the function \( q^{-1}(y) \), showing all your work.

\[
q^{-1}(y) = \frac{y}{a(1-y)}.
\]

9. [5 points] Consider the function \( D(t) \) with its graph shown below on the left, and the piecewise-defined function \( S(d) \).

\[
S(d) = \begin{cases} 
0 & d < 0 \\
-d^2 - 10d + 100 & 0 \leq d \leq 10 \\
0 & d > 10 
\end{cases}
\]

a. [1 point] Is \( S(D(t)) \) invertible?

\[ \text{yes} \quad \text{no} \quad \text{not possible to tell} \]

b. [4 points] Find all solutions \( t \) to the equation \( S(D(t)) = 25 \). Be sure to show all your work and, if necessary, estimate any coordinates on the graph of \( D(t) \) to one decimal place.

\[
\begin{align*}
25 &= -d^2 - 10d + 100 \\
0 &= d^2 + 10d - 75 = (d - 5)(d + 15) \\
n &= 5, 15.
\end{align*}
\]

Looking at the graph of \( D(t) \), the only value of \( t \) for which \( D(t) = 5 \) or 25 is \( t = 3.1 \).

\[
t = 3.1.
\]