Define \( f \) and \( g \) and find their domain.

\[
(f \circ g)(x) = f(g(x)) = f\left(\sqrt{x-1}\right) = 1 - \sqrt{x-1}
\]

**Solution:**

To find the domain of \( f \circ g \), we need to

- examine the domain of \( f \) and \( g \).

Note: We can't simplify this any further.

**Domain of \( g \):**

\[
\sqrt{x-1} \geq 0 \Rightarrow x - 1 \geq 0 \Rightarrow x \geq 1
\]

**Domain of \( f \):**

\[
1 - \sqrt{x-1} \geq 0 \Rightarrow \sqrt{x-1} \leq 1 \Rightarrow x - 1 \leq 1 \Rightarrow x \leq 2
\]

Therefore, the domain of \( f \circ g \) is \( [1, 2] \).
Recall: The domain of fog is all x in the domain of g such that g(x) is in the domain of f.

\[ (0, \infty) \cap (-\infty, -1] \cup [1, \infty) \]

\[ 1 \leq x \leq 4 \]

\[ 1 \leq x \leq 0 \]

\[ 1 \leq x \leq 2 \]

\[ x \leq 0 \]

\[ 0 \leq 1 - x \leq 1 \]
We want:

\[ 1 \nRightarrow 1 - x \]

So we want:

\[ 1 \nRightarrow 1 - x \nLeftarrow 1 \]

\[ \Rightarrow 1 \nRightarrow 1 - x \]

Such that \( g(x) = 1 - x \) is in \( (\alpha, 1] \), \( \alpha \) is in \( (\alpha, \infty) \)

So we want all \( x \) in \( (-\infty, 1] \cup [1, \infty) \).
So the domain of $f o g$ is: $[-1, 1] \cup (1, \infty)$

Look at the intersection of these real number lines:

\[-\infty \leq x \leq 1\]  \quad \text{and} \quad  \frac{-1}{2} \leq y \leq \infty \]

\[-\infty \leq x \leq 1\]

\[-\infty \leq x \leq 1\]

So we want $x$ in $(-\infty, -1] \cup (1, \infty)$