Base case: $h = 0$

Prove: $g_0 = F_{(0+2)}-1$

$$
\begin{aligned}
\text{LHS} &= g_{(0)} \\
&= 0 \\
\text{RHS} &= F_{(0+2)} - 1 \\
&= F_2 - 1 && \text{(Fibonacci definition)} \\
&= 1 - 1 \\
&= 0
\end{aligned}
$$

Induction case: $g_h = g_{(h-1)} + g_{(h-2)} + 1$

IH: Assume $g_{(h-1)} = F_{(h-1+2)}-1$

Assume $g_{(h-2)} = F_{(h-2+2)}-1$

$$
\begin{aligned}
g_{(h)} &= G_{(h-1)} + G_{(h-2)} + 1 \\
&= (F_{(h-1+2)} - 1) + (F_{(h-2+2)} - 1) + 1 \\
&= (F_{(h+1)} - 1) + (F_h - 1) + 1 && \text{(IH definition)} \\
&= F_{(h+1)} + F_h - 1 \\
&= F_{(h+2)} - 1 && \text{(Fibonacci definition)} \\
&= g_h
\end{aligned}
$$

Done.