$\phi = \frac{1+\sqrt{5}}{2} \qquad \hat{\phi} = \frac{1-\sqrt{5}}{2}$

$\phi^2 = \left(\frac{1+\sqrt{5}}{2}\right)^2 = \frac{(1+\sqrt{5})^2}{4} = \frac{1+2\sqrt{5}+5}{4} = \frac{6+2\sqrt{5}}{4} = \frac{3+\sqrt{5}}{2}$

$= \frac{1+\sqrt{5}}{2} + 1 = \phi + 1$

$\hat{\phi}^2 = \left(\frac{1-\sqrt{5}}{2}\right)^2 = \frac{(1-\sqrt{5})^2}{4} = \frac{1-2\sqrt{5}+5}{4} = \frac{6-2\sqrt{5}}{4} = \frac{3-\sqrt{5}}{2} =$

$= \frac{1-\sqrt{5}}{2} + 1 = \hat{\phi} + 1$

IA: $n = 1 \Rightarrow \frac{\phi - \hat{\phi}}{\sqrt{5}} = \frac{\frac{1+\sqrt{5}}{2} - \frac{1-\sqrt{5}}{2}}{\sqrt{5}} = \frac{\sqrt{5}}{\sqrt{5}} = \underline{1}$

$n = 2 \Rightarrow \frac{\phi^2 - \hat{\phi}^2}{\sqrt{5}} = \frac{(\phi+1)-(\hat{\phi}+1)}{\sqrt{5}} = \frac{\phi+1-\hat{\phi}-1}{\sqrt{5}} = \frac{\phi-\hat{\phi}}{\sqrt{5}} = \underline{1}$

IS: $f(n) = f(n-1) + f(n-2)$ für alle $n \geq 3$

$f(n-1) + f(n-2) = \frac{\phi^{n-1} - \hat{\phi}^{n-1}}{\sqrt{5}} + \frac{\phi^{n-2} - \hat{\phi}^{n-2}}{\sqrt{5}} =$

$= \frac{\phi^{n-2}(\phi+1) - \hat{\phi}^{n-2}(\hat{\phi}+1)}{\sqrt{5}} = \frac{\phi^{n-2}\cdot\phi^2 - \hat{\phi}^{n-2}\cdot\hat{\phi}^2}{\sqrt{5}} =$

$= \frac{\phi^n - \hat{\phi}^n}{\sqrt{5}} = f(n)$

$\Rightarrow f(1) = 1, \quad f(2) = 1, \quad f(n-1) + f(n-2) = f(n)$

Da $\hat{\phi} < \phi \Rightarrow$ dominantes Term: $\phi^n \Rightarrow \Theta(\phi^n)$