230. Consider the first-order difference equation $y[n] + 2y[n-1] = x[n]$. Assuming initial rest ($x[n]=0 \ \forall \ n<n_0 \Rightarrow y[n]=0 \ \forall \ n<n_0$), find the impulse response of a system that satisfies this.

Let $x[n] = \delta[n]$, then $y[n] = x[n] * h[n] = \delta[n] * h[n] = h[n]$

$y[n] = x[n] - 2y[n-1] = \delta[n] - 2y[n-1]$ *

$x[n]=0 \ \forall \ n<0 \Rightarrow y[n]=0 \ \forall \ n<0$

$y[0] = x[0] - 2y[-1] = \delta[0] - 0 = 1$

$y[n] = -2y[n-1] \ \forall \ n>0 \Rightarrow \forall n>0, \ y[n] = -2y[n-1] = -2\cdot(-2)\cdot y[n-2] = \dots = (-2)(-2)\dots(-2)y[n-n] =$

$= (-2)^n \cdot y[0]$

$y[0] = 1 = (-2)^0$ } $\Rightarrow$

$\Rightarrow y[n] = (-2)^n \ \forall \ n \geq 0 \Rightarrow y[n] = \boxed{(-2)^n u[n] = h[n]}$