

... 2.28. (2)

$$f) h[n] = \left(-\frac{1}{2}\right)^n u[n] + (1.01)^n u[1-n]$$

$$h[-1] = \left(-\frac{1}{2}\right)^{-1} \cdot 0 + (1.01)^{-1} u[1+1] = \frac{1}{1.01} \neq 0 \Rightarrow \boxed{\text{not causal}}$$

$$\sum_{k=-\infty}^{\infty} |h[k]| \leq \sum_{k=0}^{\infty} \left| \left(-\frac{1}{2}\right)^k \right| + \sum_{k=-\infty}^{-1} |(1.01)^k| = \frac{1}{1 - \frac{1}{2}} + \sum_{k=0}^{\infty} (1.01)^{-k} = \frac{2}{1} + \frac{1}{1 - \frac{1.01}{100}} = \frac{2}{1} + \frac{100}{1 - 1.01} = \frac{2}{1} + \frac{100}{-0.01} = \frac{2}{1} - \frac{10000}{1} = -9998$$

$$\frac{200 + 303}{100} = \frac{503}{100} = 5.03 < \infty \Rightarrow \boxed{\text{stable}}$$

$$g) h[n] = n \left(\frac{1}{3}\right)^n u[n-1]$$

$$h[n] = 0 \quad \forall n < 1 \Rightarrow h[n] = 0 \quad \forall n < 0 \Rightarrow \boxed{\text{causal}}$$

$$\sum_{k=-\infty}^{\infty} |h[k]| = \sum_{k=1}^{\infty} k \left(\frac{1}{3}\right)^k = \frac{1}{3} \sum_{k=1}^{\infty} k \left(\frac{1}{3}\right)^{k-1} = \frac{1}{3} \cdot \frac{1}{\left(1 - \frac{1}{3}\right)^2} = \frac{1}{3} \cdot \frac{1}{\left(\frac{2}{3}\right)^2} = \frac{1}{3} \cdot \frac{9}{4} = \frac{3}{4} < \infty \Rightarrow \boxed{\text{stable}}$$

$$\sum_{k=-\infty}^{\infty} |h[k]| = \sum_{k=-\infty}^{\infty} \left| k \left(\frac{1}{3}\right)^k \right| u[k-1] = \sum_{k=1}^{\infty} k \left(\frac{1}{3}\right)^k = \frac{\frac{1}{3}}{\left(1 - \frac{1}{3}\right)^2} = \frac{\frac{1}{3}}{\left(\frac{2}{3}\right)^2} = \frac{\frac{1}{3}}{\frac{4}{9}} = \frac{1}{3} \cdot \frac{9}{4} = \frac{3}{4} < \infty \Rightarrow \boxed{\text{stable}}$$