

1. Find Z transform and ROC for $x[n] = \begin{cases} 1 & n=0 \\ 2 & n=1 \\ 0 & \text{elsewhere} \end{cases}$
 $x[n] = \delta[n] + 2\delta[n-1]$

$$\boxed{X(z) = 1 + 2z^{-1}} \quad \text{ROC everywhere except } z=0 \text{ since } z^{-1} \text{ blows up}$$

2. Find Z transform and ROC for $x[n] = (-\frac{1}{2})^n u[n]$

$$\boxed{X(z) = \frac{1}{1 + \frac{1}{2}z^{-1}}, |z| > \frac{1}{2}}$$
 from tables

3. Find Z transform for $x[n] = (\frac{1}{2})^{n-1} u[n-3]$

Easy to do $(\frac{1}{2})^{n-3} u[n-3] \Rightarrow \frac{1}{1 - \frac{1}{2}z^{-1}} z^{-3}$ (ignore the shift then $\times z^{-3}$)

Multiply both sides of above by $(\frac{1}{2})^2$

$$(\frac{1}{2})^{n-3} (\frac{1}{2})^2 u[n-3] \Leftrightarrow \frac{1}{1 - \frac{1}{2}z^{-1}} z^{-3} (\frac{1}{2})^2$$

$$\underbrace{(\frac{1}{2})^{n-1} u[n-3]}_{\text{what is given so}} \Leftrightarrow \boxed{\frac{1}{1 - \frac{1}{2}z^{-1}} z^{-3} (\frac{1}{2})^2}$$

answer