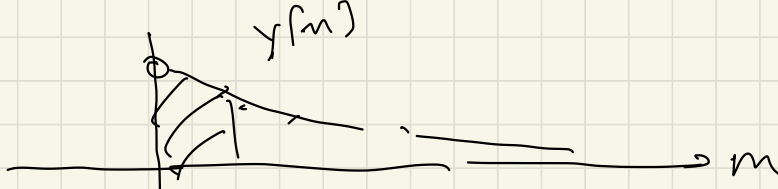
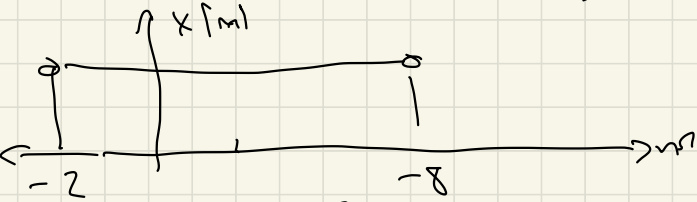


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$$x[n] = \begin{cases} 1 & -2 \leq n \leq 8 \\ 0 & \text{otherwise} \end{cases} \quad y[n] = \begin{cases} \left(\frac{3}{5}\right)^n & n \geq 0 \\ 0 & \text{otherwise} \end{cases}$$



$$x[n-m] = 1 \text{ FOR}$$

$$\boxed{-2 \leq n-m \leq 8}$$

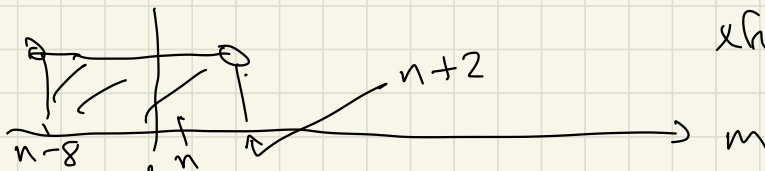
$$-n-2 \leq -m \leq -n+8$$

$$\boxed{n+2 \geq m \geq n-8}$$



$$x[n-m]$$

n overlap

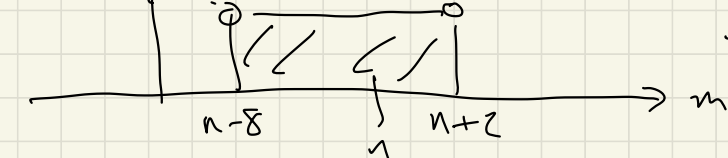


$$x[n-m]$$

partial overlap

$$n+2 \geq 0$$

$$n-8 < 0$$



$$x[n-m]$$

total overlap

$$n-8 \geq 0$$

$$z[n] = \sum_{m=-\infty}^{\infty} x[n-m] y[m]$$

$$n+2 < 0$$

$$= \begin{cases} 0 \\ \sum_{m=0}^{n+2} \left(\frac{3}{5}\right)^m \end{cases}$$

$$n \geq -2$$

$$n+2 \geq 0$$

$$n < 8$$

$$n-8 < 0$$

$$\sum_{m=n-8}^{n+2} \left(\frac{3}{5}\right)^m$$

$$n \geq 8$$

$$n-8 \geq 0$$

$$\sum_{m=0}^{n+2} \left(\frac{3}{5}\right)^m$$

$$-2 \leq n < 8$$

$$= \sum_{m=0}^{\infty} a^m = \frac{1 - a^{\infty+1}}{1 - a}$$

$$Z(n) = \begin{cases} 0 & n < -2 \\ \frac{1 - \left(\frac{3}{5}\right)^{n+3}}{1 - \left(\frac{3}{5}\right)} & -2 \leq n < 8 \\ \frac{1 - \left(\frac{3}{5}\right)^n}{1 - \left(\frac{3}{5}\right)} \cdot \left(\frac{3}{5}\right)^{n-8} & 8 \leq n \end{cases}$$

$$\sum_{m=n-8}^{n+2} \left(\frac{3}{5}\right)^m = \left(\frac{3}{5}\right)^{n-8} \sum_{k=0}^{n+2-(n-8)} \left(\frac{3}{5}\right)^k$$

$$k = m - (n-8) \Rightarrow \left(\frac{3}{5}\right)^{n-8} \frac{1 - \left(\frac{3}{5}\right)^{n+2-(n-8)+1}}{1 - \frac{3}{5}}$$

