

$$x^3 + 0x^2 + 1x + 2x^0 + 2x^{-1} + x^{-2} + \dots$$

**Ex. 1**

ESC - x  $\Rightarrow$  something, no output/data

ESC - ESC  $\Rightarrow$  ESC

0-255 equally likely

probability of ESC is  $\frac{1}{256}$

character rate on average is  $\frac{256}{256+1}$

e.g. 1 million characters  
how many ESC?

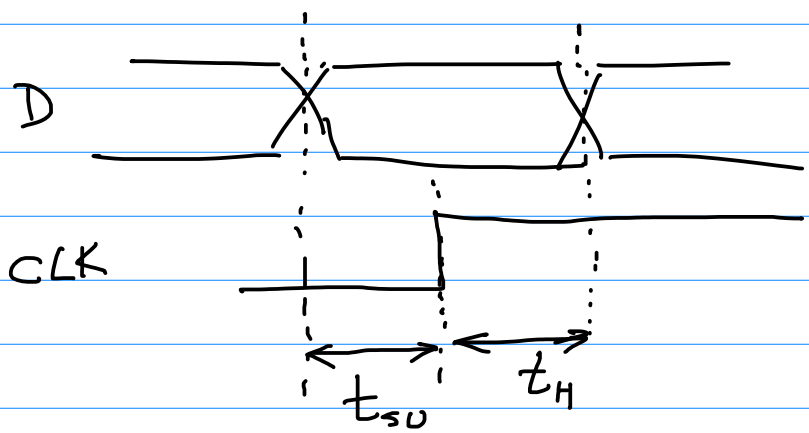
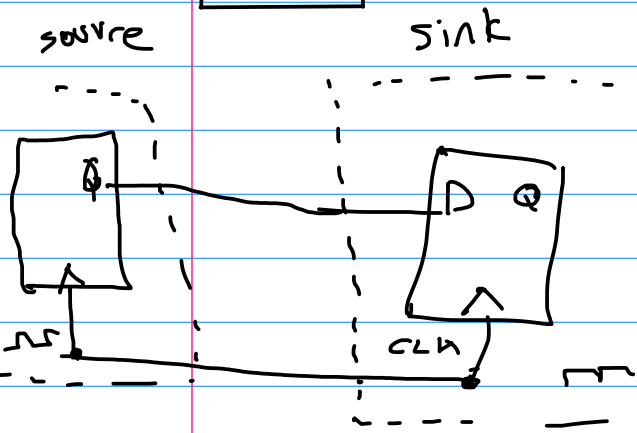
$$\#ESC : 10^6 \cdot \frac{1}{256}$$

- ① total information sent =  $10^6$
- ② total bytes =  $10^6 + \frac{10^6}{256}$

$$\begin{aligned} \text{throughput} &= \frac{\text{①}}{\text{②}} = \frac{10^6}{10^6 + \frac{10^6}{256}} = \frac{1}{1 + \frac{1}{256}} \\ &= \frac{256}{256+1} \end{aligned}$$

for all ESC  $\Rightarrow$  throughput =  $\frac{1}{2}$

**Ex. 2**



**Ex. 3**

avoids  
 ↓  
 (underflow) signals  
 (overflow) control of ACK  
 (underflow) escape sequences

flow control method	ASYNCH	SYNCH	
		SOURCE-CLOCKED	SINK-CLOCKED
DATA READY	N	N	Y
CTS	Y	Y	N
control of ACK	Y	Y	N
escape sequences	N	N	Y

⇒ source-clocked & asynch. i/f need overflow protection  
 ⇒ sink-clocked i/f needs underflow protection

