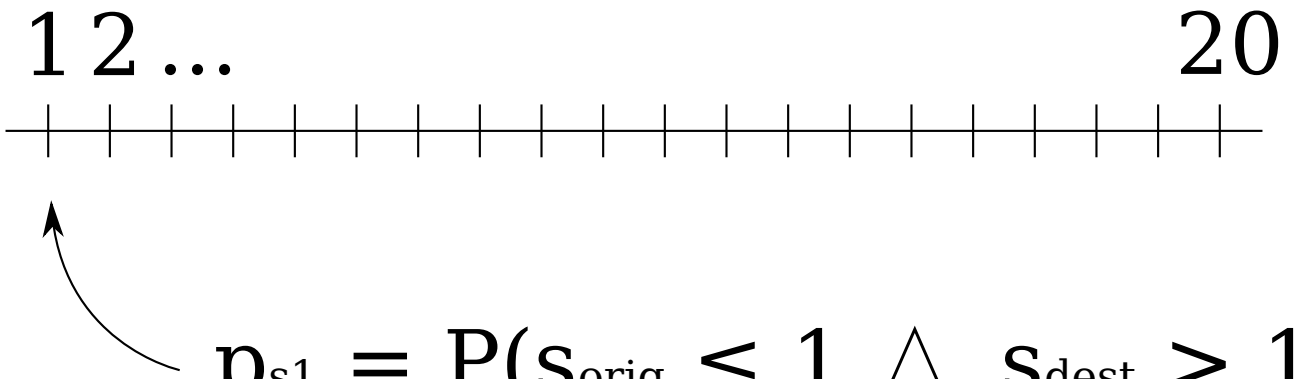
$s_{orig} = \text{rand}(1:20)$ $\quad p_{orig} = 1/20$

$s_{dest} = \text{rand}(1:20)$ $\quad p_{dest} = 1/20$

We only look at travelers in one direction:

$$s_{dest} > s_{orig}$$

Let us draw the train line:



$$\begin{aligned} p_{s1} &= P(s_{orig} \leq 1 \wedge s_{dest} > 1) \\ &= P(s_{orig} \leq 1) P(s_{dest} > 1) \\ &= 1/20 \cdot 19/20 \\ &= 19/400 \end{aligned}$$

In the general case:

$$\begin{aligned} p_{si} &= P(s_{orig} \leq i) P(s_{dest} > i) \\ &= i/20 \cdot (1 - i/20) \\ &= i/20 - i^2/400 \end{aligned}$$