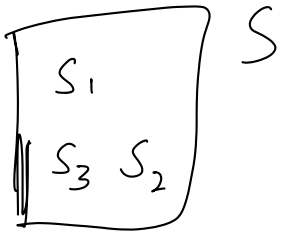
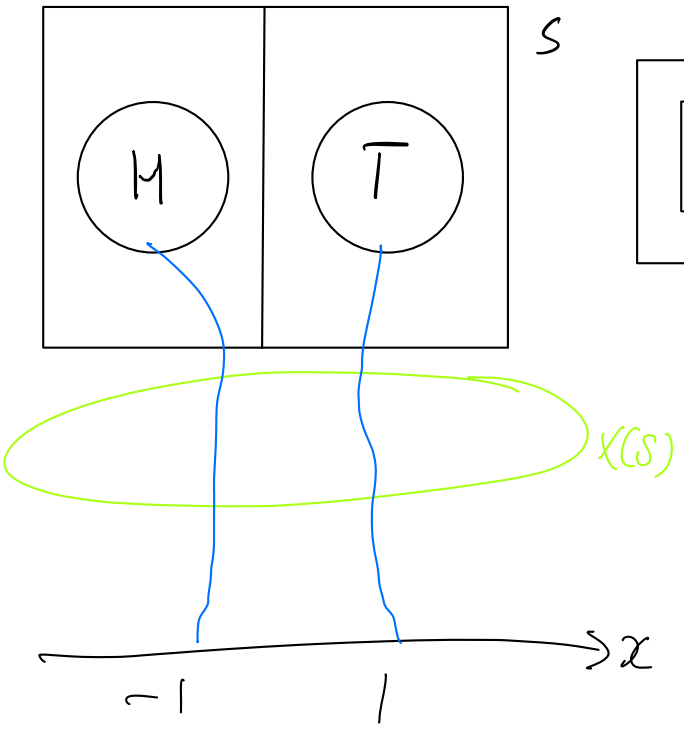


$P(s_1) = \frac{2}{5}$ $\{0, 1$

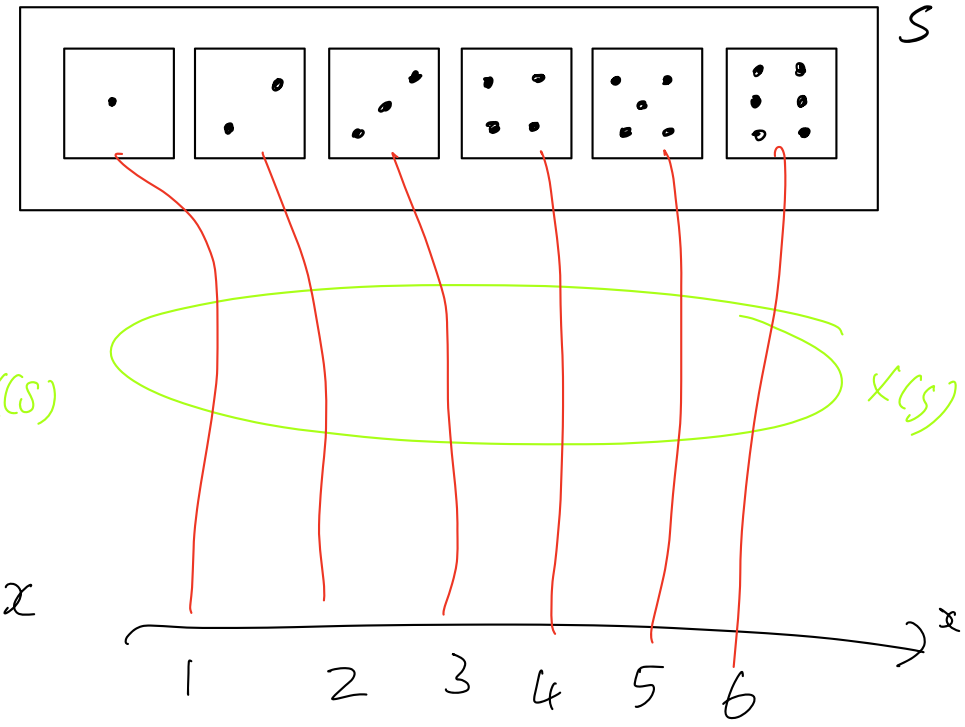
Random Variables

1. Flip a Coin



$S_X = \{-1, 1\}$

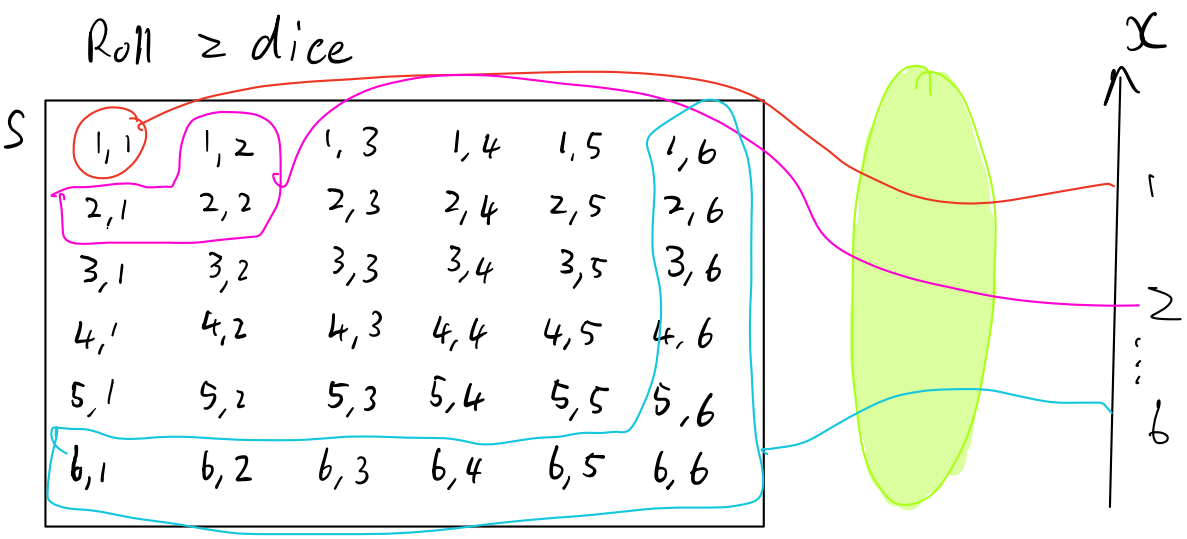
Roll a die



$S_X = \{1, 2, 3, 4, 5, 6\}$

2. A Function of the observation

Roll 2 dice



$X(S)$ = max of 2 dice

3. $S_Y = \{1, 2, 3\}$

$X = 10 - 2Y$

$S_X = \{4, 6, 8\}$

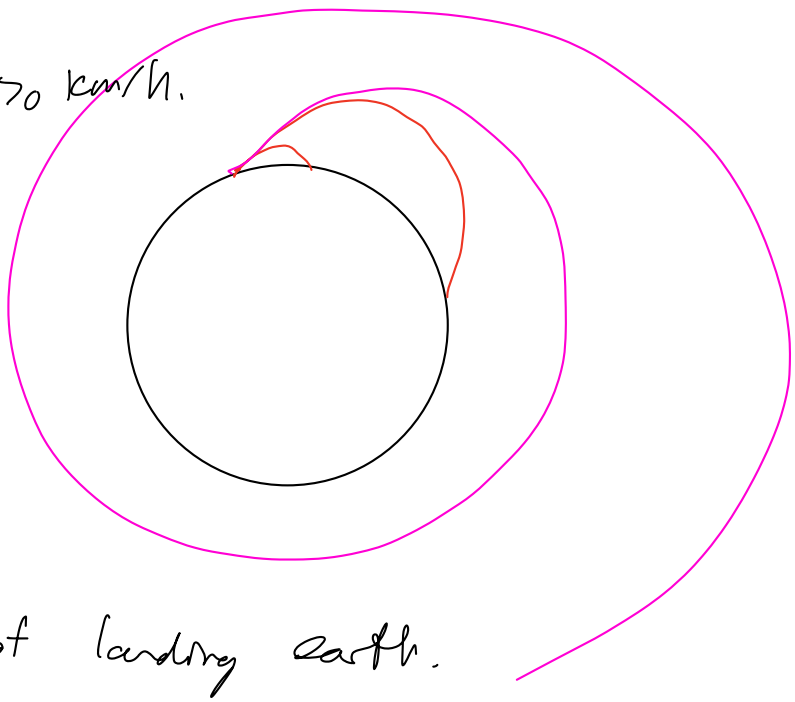
Improper experiment

Rocket fired with velocity V (in km/h).

What is time (T) in seconds that the rocket takes to land on the earth?

RV

$V > V^* = 40270$ km/h.



- Probability of landing earth.
- T in seconds to land | landed on earth

1. Roll 6-sided die $S_X = \{1, 2, 3, 4, 5, 6\}$

2. Test 6 circuits, either acceptable (a) or rejected (r)

$S_0 = aaaaaa$ $\quad 2^6 = 64$ outcomes.

$S_8 = aaraaa$

$S_{10} = aarara$

Define N number of acceptable circuits.

$S_N = \{0, 1, 2, 3, 4, 5, 6\}$

3. Define R as revenue for batch of 6 ICs with

- R50 if acceptable (a)
- −R70 if rejected (r) — customer support + replacement

if N is number acceptable
and $(6-N)$ is number rejected
then revenue (R) is as follows:

$$R = g(N) = 50N - 70(6-N)$$
$$= 120N - 420$$

$$r_8 = 120 \cdot 5 - 420 = R180$$

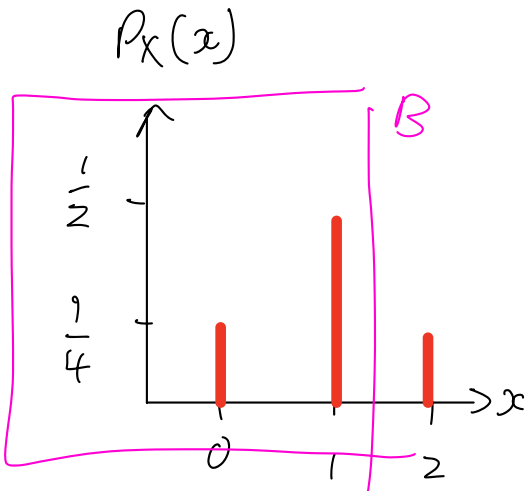
$$r_{10} = 120 \cdot 4 - 420 = R60$$

Example 3.5

Outcomes	bb	bg	gb	gg
$P(\cdot)$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
X = Points	0	1	1	2

$S_X = \{0, 1, 2\}$

$$P_X(x) = \begin{cases} \frac{1}{4} & x = 0 \\ \frac{1}{2} & x = 1 \\ \frac{1}{4} & x = 2 \\ 0 & \text{otherwise.} \end{cases}$$



$B < 2$

$P(B) = P_X(0) + P_X(1)$

$= \frac{3}{4}$

Quiz 3.2

a) $\sum_{n \in S_N} P_N(n) = 1$

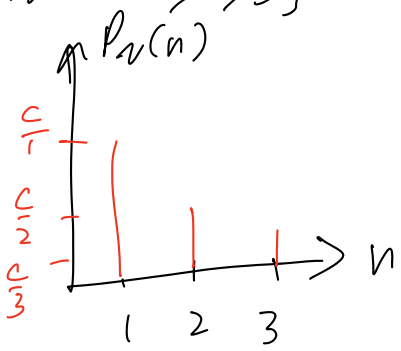
$\frac{c}{1} + \frac{c}{2} + \frac{c}{3} = 1$

$6c + 3c + 2c = 6$

$11c = 6$

$c = \frac{6}{11}$

$S_N = \{1, 2, 3\}$



b) $P(N=1) = \frac{6}{11}$

c) $P(N \geq 2) = P_X(2) + P_X(3) = 1 - P(N=1) = 1 - \frac{6}{11} = 0,\overline{45}$

$= \frac{\frac{6}{11}}{2} + \frac{\frac{6}{11}}{3} = 0,\overline{45}$

d) $P(N > 3) = 0$