Problem 2

Assume that the 6 numbers to win the lottery are a set of $X = \{x_1, x_2, x_3, x_4, x_5, x_6\}$

We can combine 6 numbers randomly from a bin of 30 in ${}^{30}C_6$ ways

To get the exact 6 numbers i.e., $x_1, x_2, x_3, x_4, x_5, x_6$

$$p = \frac{{}^{6}C_6}{{}^{30}C_6} = 0.00001684$$

If two numbers are drawn, then

$$p = \frac{{}^{4}C_4}{{}^{28}C_4} = 0.0000488$$

It is easier, or we have more chances, when two numbers are picked

Problem 3

a) There are infinite elements in the sample ...

ASSIGNMENT 1.

Problem 1

a) The possible number of ways is a combinction of M moleculer to be randomly arranged in N pores i.e

$${}^{N}C_{M} = {}^{8}C_{3} = 56$$

b) The total number of ways ~~a~~ moleculer ccn be arranged is equal ${}^{N}C_{M}$ but $M/4 < \frac{1}{2}$ i.e M is 1, 2 or 3

The total number of ways molecules ccn only be arranged in the left ride is ${}^{4}C_{M}$ such that $\frac{M}{4} < \frac{1}{2}$

$\therefore M < 2 \Rightarrow M$ is 1

The probability of having molecules on the left ~~hemisp~~ side "p"

$$P = \frac{{}^{4}C_{1}}{{}^{8}C_{1} + {}^{8}C_{2} + {}^{8}C_{3}} = 0.043$$

c) $$\frac{\binom{N/2}{\rho N}}{{}^{N}C_{M}}$$

1, 2, 3

Problem 3

There exists infinite elements in the sample space

$A = \{S^X, M^X M^Y S^X, M^X M^Y M^X M^Y S^X\}$

$P(X \text{ wins}) = 1/3$ $\quad$ $P(X \text{ loses}) = 2/3$

$P(Y \text{ wins}) = 1/4$ $\quad$ $P(Y \text{ loses}) = 3/4$

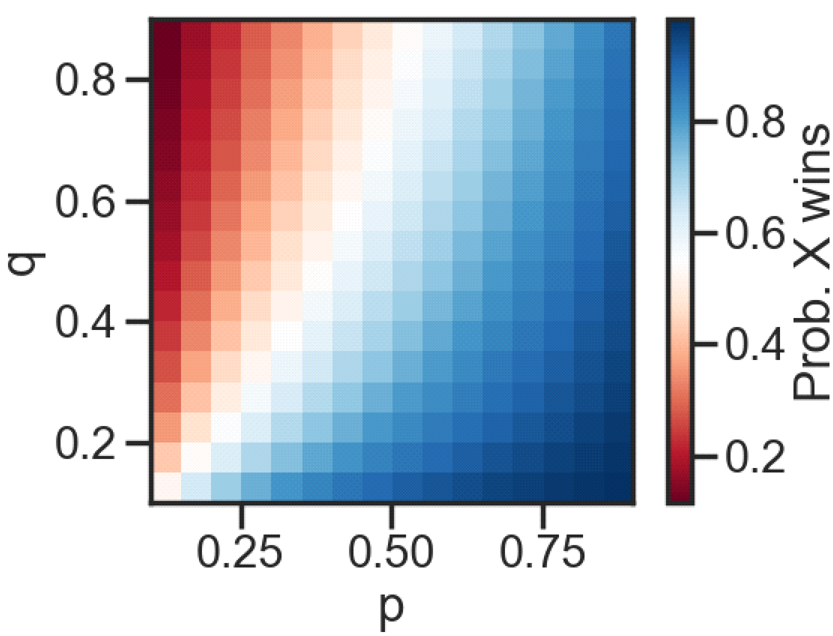
Let "n" be the number of ~~attemp~~ attempts made by X before making the shot.

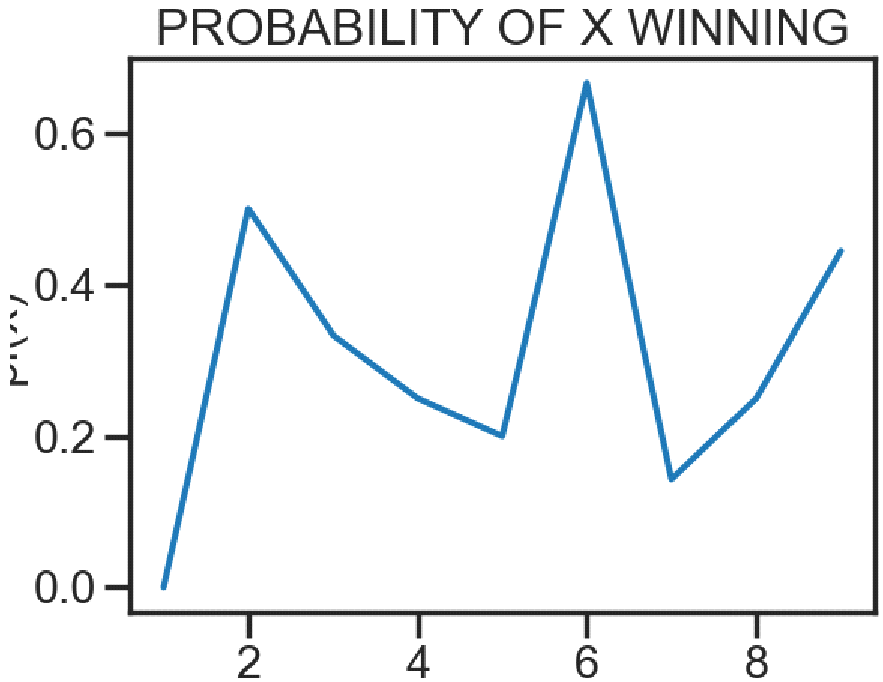
n	Event	P
0	S^X	$1/3$
1	$M^X M^Y S^X$	$2/3 \cdot 3/4 \cdot 1/3$
2	$M^X M^Y M^X M^Y S^X$	$2/3 \cdot 3/4 \cdot 2/3 \cdot 3/4 \cdot 1/3$
⋮	⋮	
∞	$M^X \dots S^X$	$\frac{1}{3}\left(\frac{2}{3}\right)^n \left(3/4\right)^n$

The probability that X wins the game is the summation of the terms as they go to infinity i.e

$$\sum_{n=0}^{\infty} \frac{1}{3}\left(2/3\right)^n \left(3/4\right)^n = \sum_{n=0}^{\infty} \frac{1}{3}\left(\frac{2}{3}\cdot\frac{3}{4}\right)^n = \sum_{n=0}^{\infty} \frac{1}{3}\left(2/4\right)^n = \frac{2}{3}$$

Generally, for p's q, $E(X) = p\sum_{n=0}^{\infty}\left((1-p)(1-q)\right)^n = p\,\frac{1}{1-(1-p)(1-q)} = \frac{p}{-pq+q+p}$




PROBABILITY OF X WINNING
0.0
0.2
0.4
0.6
2
4
6
8