7.)

T ways to ask 8 questions to 15 ppl.: 15^8

# of ways to select 8 students from 15 in order: $15P8$

probability no student will have the answer more than 1 question: $15P8 / 15^8$

$\Rightarrow$ 0.107 //

2-) 0 - 100 all 2 digit

So not possible to form them with 3 odd.

100 - 1000

No. of required integers: 5 · 4 · 5 = 100

1000 - 10000

No. of required integers: 5 · 4 · 7 · 5 = 700

10000 - 99999

No. of required integers: 5 · 4 · 7 · 6 · 5 = 4300

Total # of required int. = 5000

Total # of int from 0 - 99999 = 10^5

probability of getting a req. integer = $5000/10^5 = 0.05$

Generate 8 numbers

$n = 8 \quad p = 0.05$

$P(x = 5) = {}^8C_5 (0.05)^5 (1 - 0.05)^3$

$P(x = 5) = 1.5004 \cdot 10^{-5}$

3.) probability of Value $\geq 4 = 3/6$

here, $P(A) = P(\geq 2$ dice show $\geq 4)$

$\Rightarrow P(x=2) + P(x=3) = 3C_2 \cdot \left(\frac{1}{2}\right)^2 \cdot \left(\frac{1}{2}\right) + 3C_3 \cdot \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)$

$= 1/2$

$P(B) = P($ all 3 shows same number$)$

$\Rightarrow 6/6^3 = 1/36$

$P(A \cap B) = P($ all 3 same and $\geq 4)$

$\Rightarrow 1/6^3 + 1/6^3 + 1/6^3 = 1/72$

Since $P(A) \cdot P(B) = 1/72 = P(A \cap B)$

A, B are independent

4.)

Probability of flush on 5-card hand

$$\Rightarrow p = \frac{4 \cdot 13C5}{52C2} = 0.00198$$

$$E[X] = \frac{1}{p} = 504.846$$

5.) $P(\text{win} \mid \text{SuperStar}) = 0.7$

$P(\text{win} \mid \text{No Super}) = 0.5$

$P(\text{Super plays}) = 0.75$ for next 5 games

Therefore,

$P(\text{win } 4/5 \mid \text{Super plays}) = 5C4 \cdot (0.7)^4 \cdot 0.3 = 0.36015$

$P(\text{win } 4/5 \mid \text{Super No plays}) = 5C4 \cdot (0.5)^5 = 0.15625$

$P(\text{win } 4/5) = 0.15625 \cdot 0.25 + 0.36015 \cdot 0.75 = 0.309225$

Therefore, $P(\text{Super plays} \mid \text{win } 4/5) = 0.36075 \cdot 0.75 / 0.309225$

$\Rightarrow 0.87371$