

Tutorial-2

Question 4 (Sum of dice)

$$\{(1,3), (2,2), (3,1)\} \Rightarrow 4$$

$$\{(1,5), (2,4), (3,3), (4,2), (5,1)\} \Rightarrow 6$$

$$P(\text{Neither 4 or 6}) = \frac{36-8}{36} = \frac{28}{36}$$

$$\text{Let } P(\text{sum of 6 appears first}) = p \quad \leftarrow \text{Ans}$$

$$p = P(\text{neither 4 or 6}) \times p + P(\text{getting 6}) \times 1 + P(\text{getting 4}) \times 0$$

$$p = \frac{28}{36} \times p + \frac{5}{36}$$

$$\Rightarrow \frac{8}{36} p = \frac{5}{36} \Rightarrow p = \frac{5}{8}$$

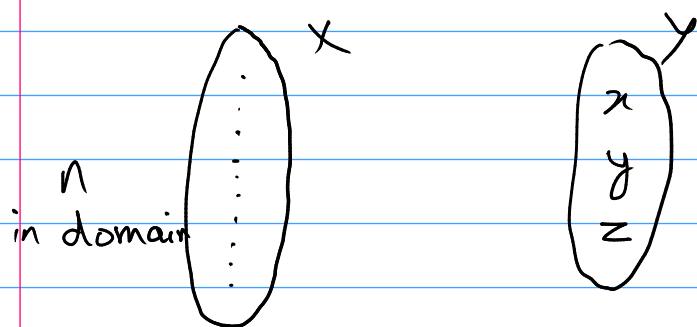
[Can also be done by G.P. but this is neater :)]

Question 5 (90 students, 3 classes)

$$\text{Joe — class X} \Rightarrow \begin{array}{ccc} X & Y & Z \\ 29 & 30 & 30 \end{array}$$

$$\text{Jane goes in X} \Rightarrow \frac{29}{89}$$

Question 6 (Onto function)



Onto \rightarrow every element in Y has a pre-image

Number of onto fns = $3^n - \text{range omits at least one}$

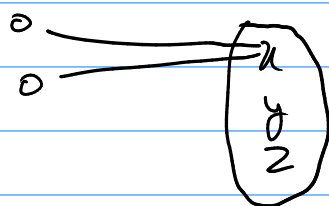
$$= 3^n - \left[(\text{range omits } x + \text{omits } y + \text{omits } z) - (\text{range omits } (xy, + yz + zx)) \right]$$

\rightarrow see principle of inclusion exclusion

$$= 3^n - [3 \cdot 2^n - 3 \cdot 1]$$

$$= 3^n - 3 \cdot 2^n + 3$$

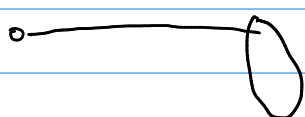
(a)



$$= \frac{{}^nC_2 (2^{n-2} - 2)}{3^n - 3 \cdot 2^n + 3}$$

$${}^nC_2 (2^{n-2} - 2)$$

(b)



$$\frac{n(2^{n-1} - 2)}{3^n - 3 \cdot 2^n + 3}$$