SMFD

Q1) $= P = 1 - P(\text{No Collided}) = 1 - \frac{D_{50}}{50!}$

$= 1 - \frac{1}{e} = \boxed{0.632}$

Q3) a) $P(A \cap B / C) = \frac{P(A \cap B \cap C)}{P(C)} =$

$P(A / B \cap C) = \frac{P(A \cap B \cap C)}{P(B \cap C)}$

$\therefore \boxed{\frac{P(A \cap B / C)}{P(A / B \cap C)} = \frac{P(B \cap C)}{P(C)} = P(B / C)} \rightarrow$ TRUE

b) False

c) True

Q5) $P(X \leq K) = \frac{K}{N}$ → Uniform dist.

$P(X_n \leq K) = \left(\frac{K}{N}\right)^n$

$\therefore$ PMF $\approx$ $P(X_n = K) = \boxed{\left(\frac{K}{N}\right)^n - \left(\frac{K-1}{N}\right)^n}$

$\boxed{E(\text{PMF}) = \frac{1}{N^n} \sum_{1}^{N} K \cdot [K^n - (K-1)^n]}$

$(n+1)$

(Q7)

a) 1, 2, ... n+1

↓ origin

1 label x,

x will tell anyone with $P = 1/n$

except (1) & $\left(\frac{n-1}{n}\right)$ probability

& we need $r-1$ times (1st time by 1)

$\therefore \left(\frac{n-1}{n}\right)^{r-1}$

b) $\frac{n-1}{n} \times \frac{n-2}{n} \cdots \frac{n-(r-1)}{n}$

$= \frac{(n-1)!}{(n-r)!} \times \frac{1}{n^{r-1}}$

II a) $\frac{{}^{n-1}C_N}{{}^{n}C_{N+1}}^{(r-1)}$

b) $\frac{\binom{n-1}{N}}{{}^{n}C_N} \times \frac{\binom{n-1-N}{1}}{{}^{n}C_{N+1}} \cdots$

(Q9) $F_X(x)$, $F_Y(y)$ → Distributions

let $\boxed{F_Z(z) = F_X(z) * F_Y(z)}$

I) Non decreasing: F_X, F_Y nondecreasing

then $\int F_X(z-x) F_Y(x)$

for fixed x, increasing with z,

& integral of +ve func is ↑ when $z \to \infty$ ✓

II) Right continuous: integral of continuous func is always continuous

III) At inf: $z \to \infty$, $F_X(z-x) \to F_X(\infty) = 1$

& $\int F_Y(x) \times 1 = \underline{1}$

$z \to -\infty$, $F_X(z-x) \to 0$

& $\int 0 \times f_Y(x) = \boxed{0}$