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-Exam I

$$\boxed{Q1} \quad P(E) = \frac{2}{8} = \frac{1}{4} = \boxed{0.25}$$

$$\begin{aligned} P(E) &= {}^8C_1 (0.7)^1 (0.3)^7 \\ &= 8 \times 0.024706 \\ &= \boxed{0.1976} \end{aligned}$$

$$\begin{aligned} \boxed{Q23} \quad P(x, 1) &= \frac{3^2 \times e^{-3}}{2!} \\ &= \frac{9 \times 0.0498}{2 \times 1} = \frac{0.4481}{2} = \boxed{0.224} \end{aligned}$$

$\boxed{Q20}$ P(10th person interviewed to become software eng) = Choosing B out of 9 and then the 10th to be software eng =

$$= {}^9C_3 (0.4)^3 (0.6)^6 (0.4)$$

$$= 84 \times 0.0956 \times 0.0467 = \boxed{0.1004}$$

$$\boxed{Q3} \quad P(A) = \frac{40}{100}, \quad P(B) = \frac{30}{100}$$

$$P(A \cap B) = \frac{20}{100}$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{2}{3} = \boxed{0.6667}$$

$\boxed{Q5}$ For any Random Variables x, x_2, \dots, x_n

$E[x_1 + x_2 + \dots + x_n] = E[x_1] + E[x_2] + \dots + E[x_n]$
by addition Rule of Expectations is True

Q4 Prob students know the ans correct ✓

$$= 1 \times \frac{4}{5} + \frac{1}{4} \times \frac{1}{5} = 0,85$$

$$\text{The Prob Not the Know} = \frac{1 \times \frac{1}{5}}{1 \times \frac{4}{5} + \frac{1}{4} \times \frac{1}{5}} = 0,94$$

Q18 $X \sim B(20, 0,93)$

$$P(X \leq 1) = \sum_{x=0}^1 {}^{20}C_x (0,07)^x (0,93)^{20-x}$$

$$= 0,587$$

Q17 $x=2$, then $(8x+13) = (8x) = 8 \times \log(x)$

$$= 64 \times 2 = 128 \Rightarrow (8x+13) = 128$$

Q6 4 children can be arranged $= {}^4P_4 = \frac{4!}{(4-4)!} = 24 \text{ ways}$

Q9 $k=4$ $n=12$

$$\binom{11}{3} = 165$$

Q14

P(3)

$\approx 0,6$

Q22 $P(X=31) + P(X=32)$

$$= \binom{32}{31} 0.95^{31} 0.05 + \binom{32}{32} 0.95^{32}$$

$$= \boxed{0.52}$$

Q19 $P(m) = \text{Mary Passes 1st attempt} = 0.8$

$P(A) = \text{Anna Passes 1st attempt} = 0.2 \times 0.8 = 0.16$

$P(m \cap A) = P(m) \times P(A)$

$$= 0.8 \times 0.16 = 128$$

Q11 a) ${}^{12}C_3 = \frac{12!}{9! \cdot 3!} = \frac{1320}{6} = \boxed{220}$

b) ${}^5C_1 \times {}^7C_2 = \frac{5!}{4! \cdot 1!} \times \frac{7!}{5! \cdot 2!}$

$$= \frac{5 \times 7 \times 6}{2} = \boxed{105}$$

Q14 $P(X=2) = 0.2$

$P_X(3) = P(Y \leq 3) = P(X=1) + P(X=2) + P(X=3)$

$$= \boxed{0.6}$$

$$\underline{a73} \quad \{X(P(X)) = 6.2$$

$$\{X^2 \times P(X) = 66.$$

$$\text{Var}(X) = 66 - (6.2)^2 = 27.56$$

$$\textcircled{2} \quad (X=2) = \frac{\binom{20}{2} \times \binom{10}{1}}{\binom{30}{3}} = \boxed{0.046}$$

$$\textcircled{8} = \binom{13}{3}$$

$$= \frac{12!}{1!1!3!1!1!1!1!2!1!} = \frac{12!}{3!2!}$$

$$= \frac{11!}{3!}$$

$$\textcircled{19} = \binom{50+3}{3}$$

$$\textcircled{2} \quad F = 0.42, S = 0.36, F \cap S = 0.15$$

$$[(F \cup S) = 0.42 + 0.36 - 0.15] \quad \sqrt{27}$$

$$[F \cap S] = 1 - (0.42 + 0.36 - 0.15) = \boxed{0.37}$$