

Quiz 1 Questions:

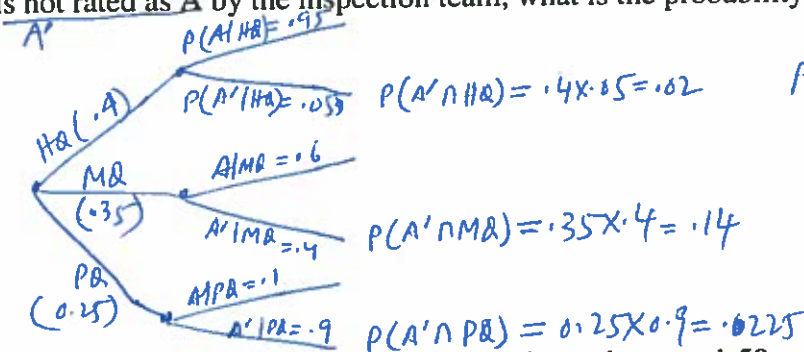
Question 1. In a manufacturing company, 40% of the products are of high quality, 35% are of medium quality, and the rest are poorly manufactured. A large sample of these products are inspected and rated as follows by a team of quality control engineers:

- 95% of the high quality products are rated as A,
- 60% of the medium quality products are rated as A,
- 10% of the poor quality products are rated as A.

$$P(\text{HQ given } A') = P(\text{HQ} | A') = ?$$

If a product is not rated as A by the inspection team, what is the probability that it is of high quality?

- (a) 0.62
- (b) 0.38
- (c) 0.05
- (d) 0.61
- (e) 0.83



$$P(HQ | A') = \frac{P(HQ \cap A')}{P(A')} = \frac{.02}{.385}$$

$$P(A') = .02 + .14 + .225 = .385$$

Then,

$$P(HQ | A') = \frac{.02}{.385} = \boxed{.052}$$

	A'
HQ	
MQ	
PQ	

Question 2. Each student from a group of 40 female students and 50 male students has enrolled in either Statistics or History course (not both). Reports show that 15 female and 20 male students have enrolled in the History course. A student is randomly selected from the Statistics course, what is the probability that this student is female?

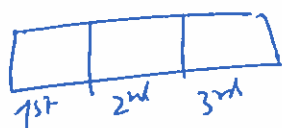
- (a) 27.8%
- (b) 45.5%
- (c) 42.4%
- (d) 61.1%
- (e) 50%

	S, Statistics	H, History	Total
M, Male	50 - 20 = 30	20	50
F, Female	40 - 15 = 25	15	40
Total	55	35	90

$$P(F | S) = \frac{P(F \cap S)}{P(S)} = \frac{25/90}{55/90} = \boxed{45.45\%}$$

Question 3. Three fair dice are thrown. What is the probability that the sum of the numbers is 11 and at least one of the numbers is even?

- (a) 0.125
- (b) 0.150
- (c) 0.200
- (d) 0.115
- (e) 0.097



$$11 = 6 + 4 + 1, \text{ etc}$$

Sum = 11
At least one is even

6	4	1	→ 3! = 6 ways	{(6, 4, 1), (6, 1, 4), (1, 4, 6), (4, 6, 1), (4, 1, 6), (1, 6, 4)}
6	3	2	→ 3! = 6	
5	4	2	→ 3! = 6	
4	3	4	→ $\frac{3!}{2!} = 3$	

$$n = 6 + 6 + 6 + 3 = 21$$

$$\text{Total ways } N = 6 \times 6 \times 6 = 216$$

$$P = \frac{n}{N} = \frac{21}{216} = \boxed{0.097}$$

Question 4. In how many ways 5 items be selected from a box containing 12 good items and 10 defective items so that the number of good items in the selection is at most 2?

- (a) 7920
- (b) 2520
- (c) 252
- (d) 10692
- (e) 15642

Maximum good item = 2

Good (12)	Defective (10)	n
0	5	$12C_0 \times 10C_5 = 1 \times 252 = 252$
1	4	$12C_1 \times 10C_4 = 12 \times 210 = 2520$
2	3	$12C_2 \times 10C_3 = 66 \times 120 = 7920$
		Total ways = $\boxed{10,692}$

Question 5. A carton of 12 rechargeable batteries contains two batteries that are defective. In how many ways can the inspector choose three of the batteries and get at least one of the defective ones?

- (a) 120
- (b) 100
- (c) 220
- (d) 150
- (e) ~~220~~ 250

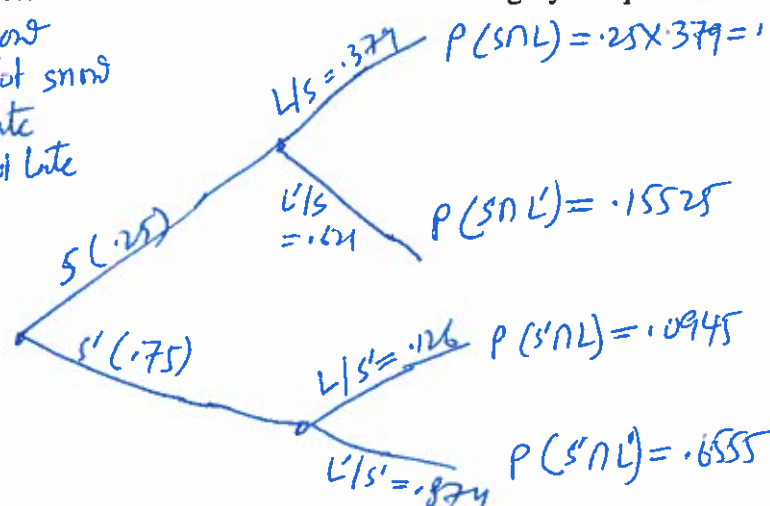
Minimum defective item = 1

Good (10)	Defective (2)	n
2	1	$10C_2 \times 2C_1 = 45 \times 2 = 90$
1	2	$10C_1 \times 2C_2 = 10 \times 1 = 10$
		Total = $\boxed{100}$

Question 6. Calgary airport statistics show that airplanes arrive on time (within 10 minutes of their scheduled arrival time) 87.4% of the time when the weather in Calgary is good, but this figure decreases to 62.1% when it snows in Calgary, which in January occurs one day out of four. Upon leaving Vancouver on January 5th, the pilot informs you that the plane will land half an hour late in Calgary. You can then determine that the chance of snow in Calgary is equal to:

- (a) 0.25
- (b) 0.31
- (c) 0.50
- (d) 0.54
- (e) 0.05

S = Snow
S' = Not snow
L = Late
L' = Not late



$$\begin{aligned}
 P(L) &= P(S \cap L) + P(S' \cap L) \\
 &= 0.09475 + 0.0945 \\
 &= 0.18925 \\
 P(S|L) &= \frac{P(S \cap L)}{P(L)} \\
 &= \frac{0.09475}{0.18925} \\
 &= \boxed{0.5}
 \end{aligned}$$

Answers:

Q1 (c) Q2 (b) Q3 (e) Q4 (d) Q5 (b) Q6 (c)