

Question 1

a) Probability that the challenge was rejected:

$$P(\text{Rejected}) = (290 + 222) / 839$$
$$= 512 / 839$$

ANSWER IS 512/839

b)

$$P(\text{Male Player or Rejected}) = P(\text{Male} \cup \text{Rejected})$$
$$= P(\text{Male}) + P(\text{Rejected}) - P(\text{Male and Rejected})$$
$$= \frac{200 + 290}{839} + \frac{(290 + 222)}{839} - \frac{290}{839}$$

$$= \frac{490}{839} + \frac{512}{839} - \frac{290}{839} = \frac{712}{839}$$

ANSWER IS 712/839

c)

$$P(\text{Accepted and Female}) = P(\text{Accepted} \cap \text{Female})$$
$$= \frac{347}{839} \times \frac{127}{327} = \frac{127}{839}$$

ANSWER IS 127/839

d)

$$P(\text{Accepted} | \text{Female}) = P(\text{Accepted and Female}) / P(\text{Female})$$
$$= \frac{127}{839} \div \frac{347}{839}$$

$$= \frac{127}{839} \times \frac{839}{347} = \frac{127}{347}$$

ANSWER IS 127/347

$$e) P(\text{Accepted} \cap \text{Accepted})$$

$$= \frac{327}{839} \times \frac{326}{838}$$

$$= \frac{53,301}{351,541}$$

$$\text{ANSWER is } 53,301/351,541$$

$$f) P(\text{Female} \cap \text{female})$$

$$= \frac{349}{839} \times \frac{349}{839}$$

$$= \frac{121,801}{703,921}$$

$$\text{ANSWER is } 121,801/703,921$$

Question 2.

$$a) \text{ Grand Prize}$$

$$P(\text{Grand}) = P(\text{Total}) - P(\text{Other Prizes})$$

$$\frac{500}{500} - \frac{498}{500} = \frac{2}{500} = \frac{1}{250}$$

$$\text{ANSWER is } 1/250$$

$$b) \text{ Prize of some type}$$

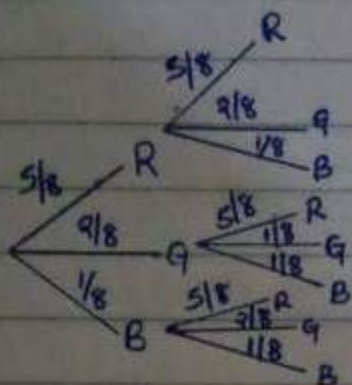
$$P(\text{Grand}) \cap \text{Second Prize}$$

$$\frac{1}{500} + \frac{9}{500} = \frac{10}{500}$$

$$\text{ANSWER is } 10/500$$

QUESTION 300

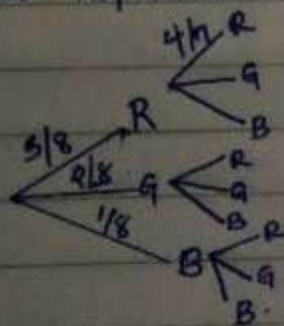
Using tree diagram, we can display the probability;
with Replacement;



$$P(\text{Two Red Marbles}) = \frac{5}{8} \times \frac{5}{8} = \frac{25}{64}$$

ANSWER IS 25/64

b) Without Replacement:



$$P(RR) = \frac{5}{8} \times \frac{4}{7} = \frac{20}{56}$$

ANSWER IS 5/14

c) Red followed by Green
= $P(RG)$

$$= \frac{5}{8} \times \frac{2}{7} = \frac{10}{56}$$

ANSWER IS 5/28

Question 4.

else Binomial probabilities with;

$$n = 5, \quad P = 0.75; \quad x = 0, 1, 2, 3, \dots, 5.$$

$$P(X \geq 1) = 1 - P(X = 0)$$

$$= 1 - {}^5C_0 (0.75)^0 (0.25)^5$$

$$= 1 - \{1 \times 1 \times 0.25^5\}$$

$$= 1 - 0.0009765625$$

$$= 0.9990234$$

ANSWER IS 0.999 (3 decimal Places).

Question 5.

Probability distribution

X	P(X)
0	0.9997
1	?

$$\text{Expected Profit} = \text{Premium of the policy} - \text{expected Pay out}$$

$$= 75 - (1 - 0.9997) \times 100000$$

$$= \$45$$

ANSWER IS \$45

Question 6.

a)	X	P(X)	XP(X)	X ²	X ² P(X)
	0	0.670	0	0	0
	1	0.276	0.276	1	0.276
	2	0.048	0.096	4	0.384
	3	0.006	0.018	9	0.054
	4	0	0	16	0
			0.39		0.714

6 a)

$$\begin{aligned}\text{Mean} &= E(x) = \sum x P(x) \\ &= 0.39\end{aligned}$$

$$\begin{aligned}\text{Variance} &= \sum x^2 P(x) \\ &= 0.714\end{aligned}$$

$$\begin{aligned}\text{Standard deviation} &= \sqrt{\text{Variance}} \\ &= \sqrt{0.714} \\ &= 0.84498521\end{aligned}$$

ANSWER IS 0.8450 (4 decimal Places)

(b)

Expected value means the number of males with ringing ears in the population.

$E(x) = 0.39$, Means it is hard to get a person with ringing ears;

$$E(x) = 0.39 \approx 0$$

Question 7

Note that this is a binomial probability distribution;

$$n = 6; \quad p = 0.2; \quad x = 0, 1, 2, \dots, 6$$

$$\begin{aligned}\text{a) } P(x=5) &= {}^6C_5 (0.2)^5 (0.8)^1 \\ &= 6(0.2)^5 (0.8)^1 \\ &= 6 \times 0.00032 \times 0.8 \\ &= 0.001536 \\ &= 0.0015 \text{ (4 decimal Places)}\end{aligned}$$

ANSWER IS 0.0015

Question 7.

$$\begin{aligned}
 \text{b) } P(X \geq 1) &= 1 - P(X=0) \\
 &= 1 - C_0^6 (0.2)^0 (0.8)^6 \\
 &= 1 - (1 \times 1 \times 0.8^6) \\
 &= 1 - 0.262144 \\
 &= 0.737856 \\
 &= 0.7379 \text{ (4 dp)}
 \end{aligned}$$

ANSWER IS 0.7379.

$$\begin{aligned}
 \text{c) } P(X \geq 3) &= P(X=4) + P(X=5) + P(X=6) \\
 &= C_4^6 (0.2)^4 (0.8)^2 + C_5^6 (0.2)^5 (0.8) + C_6^6 (0.2)^6 (0.8)^0 \\
 &= 15 (0.2)^4 (0.8)^2 + 6 (0.2)^5 (0.8) + 0.2^6 \\
 &= 15 \times 0.016 \times 0.64 + 6 \times 0.00032 \times 0.8 + 0.00064 \\
 &= 0.1536 + 0.000065536 \\
 &= 0.1536 + 0.001536 + 0.00064 \\
 &= 0.17536 \\
 &= 0.175 \text{ (4 decimal Place)}
 \end{aligned}$$

ANSWER IS 0.175

$$\begin{aligned}
 \text{d) } E(X) &= nP \\
 &= 6 \times 0.2 \\
 &= 1.2
 \end{aligned}$$

$2 > 1.2$; 2 is unusually higher

Question 8

Note that it is a binomial probability distribution with,
 $n=10$; $P=0.1$; $x=0, 1, 2, \dots, 10$

$$\begin{aligned} a) P(x=3) &= C_3^{10} (0.01)^3 (0.9)^7 \\ &= 120 \times 0.001 \times 0.4782969 \\ &= 0.05739563 \\ &= 0.0574 \text{ (4 decimal Place)} \\ \text{ANSWER IS } 0.0574 \end{aligned}$$

$$\begin{aligned} b) P(x \geq 3) &= 1 - P(x=0) + P(x=1) + P(x=2) \\ &= 1 - (C_0^{10} (0.1)^0 (0.9)^{10} + C_1^{10} (0.1) (0.9)^9 + C_2^{10} (0.1)^2 (0.9)^8) \\ &= 1 - (0.9^{10} + 10(0.1)(0.9)^9 + 45(0.1)^2 (0.9)^8) \\ &= 1 - \{0.34867844 + 0.38742049 + 0.004304672\} \\ &= 1 - 0.7404036 \\ &= 0.2595964 \\ &= 0.2596 \text{ (4 dp)} \\ \text{ANSWER IS } 0.2596 \end{aligned}$$

$$\begin{aligned} c) P(x < 3) &= P(x=0) + P(x=1) + P(x=2) \\ &= C_0^{10} (0.1)^0 (0.9)^{10} + C_1^{10} (0.1) (0.9)^9 + C_2^{10} (0.1)^2 (0.9)^8 \\ &= 0.34867844 + 0.38742049 + 0.004304672 \\ &= 0.7404036 \\ \text{ANSWER IS } 0.7404 \end{aligned}$$

$$\begin{aligned} d) E(x) &= np \\ &= 10 \times 0.1 = 1 \\ 7 > 1 \text{ ; Thus } 7 \text{ is an unusually higher Number.} \end{aligned}$$

Question 9.

Note it is a binomial distribution with;

$$n = 250$$

$$p = 0.166 \approx 16.6/100$$

$$q = 1 - 0.166 = 0.834$$

a) Mean of uninsured adults:

$$= 250 \times 0.166$$

$$= 41.5$$

ANSWER IS 41.5

b) standard deviation $\approx$ square root of variance.

$$= \text{Variance} = npq$$

$$= 250 \times 0.166 \times 0.834$$

$$= 5.883$$

ANSWER IS 5.883

c) The Probability of randomly selecting an uninsured adult.

$$P(uA) = \frac{50}{250}$$

$$= 0.2$$

Since 0.2 is greater than 0.05, it is usual

$$0.2 > 0.05$$

ANSWER IS it would be not be unusual to find that 50 us adults were uninsured.