

# 1) Probability Distribution:

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1.1) A sociologist is studying the household composition in a tribal society and is interested mainly in the number of pre-teen children in a household. It was found that 2% household do not have any child, 7% household have 1 child, 22% of the household have 2 children, 38% household have 3 children and the remaining have 4 children each. Let the random variable  $X$  represent the number of pre-teen children in a household selected at random. Find then probability distribution of  $X$ . Calculate the mean and variance  $X$ .

1.2) An insurance company is studying the number of individuals getting hurt in each auto accident. Form a random sample of 250 auto accidents taken place last year, the company has compiled the following information:

Number of individuals getting hurt:	0	1	2	3	4	5	6
Number of such auto accidents:	78	65	37	30	25	10	5

Let,  $X$  denote the number of individuals getting hurt in an auto accident. Assuming that the above sample represents the whole population of auto accidents, find an appropriate probability distribution of  $X$ . If each injured individual incurs an average medical cost of \$1200 then what is the expected medical cost per auto accident?

1.3) Each year the small Pacific island nations get hit by destructive cyclones. On an average, each cyclone causes a per household damage of \$1250. Island Nation-A has the following probability distribution for the number of cyclones it encounters per year:

Number of Cyclones per year for Nation-A:	0	1	2	3
Probability:	0.26	0.37	0.25	0.12

Similarly island Nation-B has the following probability distribution:

Number of Cyclones per year for Nation-B:	0	1	2	3
Probability:	0.43	0.42	0.12	0.03

On a large-term basis which island nations more liveable?

1.4) A popular soft-drink company did a customer survey to determine which bottle size (in millilitre) customer preferred. A random sample of 600 customers gave the following information:

Bottle size(in ml):	200	300	500	1000
Number of customers preferring this size:	320	170	90	20

If a person is chosen at random from this group of 600 customers, then

- What is the probability that he/she prefers a bottle size greater than 200 ml?
- What is the expected value of the number of millilitre a customer will prefer?
- What is the standard deviation of number of millilitres a customer will prefer?

1.5) A small software company, based in Bangalore bids on many BOD(business process outsourcing) contracts from the western countries. Current market assessment shows that the

company has a 20% chance of winning a large contract worth about \$50,000, 35% chance of winning a medium contract worth about \$25,000 and 45% chance of winning a small contract worth \$10,000. If the company bids on one small, one medium and one large contract, then what is the expected worth of contracts it gets?

1.6) A travel insurance policy for luggage cost \$50 for each piece, and will pay policy holders \$5000 for each lost luggage, or \$500 for each damage luggage. The insurance company estimates that each year, about 1 in every 1000 luggage is lost, and about 1 in 100 luggage gets damaged.

- d) Define a suitable random variable to describe this insurance probability model.
- e) What is the insurance company's expected profit from each policy?
- f) What is the standard deviation of the random variable?