

Probability

Random Variable [Cumulative Distribution Function]

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| Cumulative Distribution Function

- The **probability mass function** specifies the probability that a random variable is equal to a given value.
- The **cumulative distribution function** specifies the probability that a random variable is less than or equal to a given value

| Example - 01

- The number of flaws in a 1-inch length of copper wire manufactured by a certain process varies from wire to wire. Overall, 48% of the wires produced have no flaws, 39% have one flaw, 12% have two flaws, and 1% have three flaws. Let X be the number of flaws in a randomly selected piece of wire. Let $F(x)$ denote the **cumulative distribution function** of the random variable X that represents the number of flaws in a randomly chosen wire. Find $F(2)$. Find $F(1.5)$.

| Note...

- In general, for any discrete random variable X , the **cumulative distribution function $F(x)$** can be computed by summing the probabilities of all the possible values of X that are less than or equal to x .
- Note that **$F(x)$** is defined for any number x , not just for the possible values of X

| Example - 02

- Plot the cumulative distribution function $F(x)$ of the random variable X that represents the number of flaws in a randomly chosen wire.

| References

- Statistics for Engineers and Scientists, Fourth Edition, William Navidi
Colorado School of Mines
- Khan Academy