

CDF Random Variable

What does CDF stand for? *function.*

\Rightarrow Cumulative Distribution function

Given the table of the pmf for a random variable. Fill the table

x	1	2	3	4	5
f(x)	.2	.25	.15	.22	.18
F(x)	0.2	0.45	0.6	0.82	1

\rightarrow expected value or mean

$\Rightarrow E(x)$

cdf

$$E(x) = \sum x f(x)$$

$\checkmark F(x) = P(1) + P(2) + \dots + P(x)$

x	F(x)
1	0.1002
2	0.1268
3	0.6468
4	0.7598
5	0.7717
6	0.9001
7	0.9239
8	0.9496
9	0.9743
10	0.9880
11	0.9905
12	1.000

a. $P(X=4)$

$\Rightarrow f(4) - f(3)$

g. $P(8 \leq X < 12)$

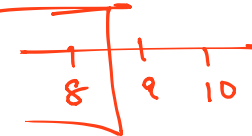
$F(11) - F(7)$

b. $P(X < 9)$

$\Rightarrow P(1) + P(2) + \dots + P(8)$

h. $P(7 \leq X \leq 11)$

$\Rightarrow f(8)$



$F(11) - F(7)$

f. $P(X \geq 13)$

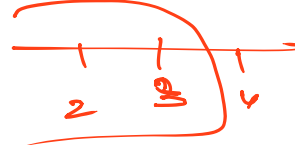
i. $P(10 < X)$

$\Rightarrow 0$

c. $P(X \leq 3) \Rightarrow P(1) + P(2) + P(3)$

$1 - F(10)$

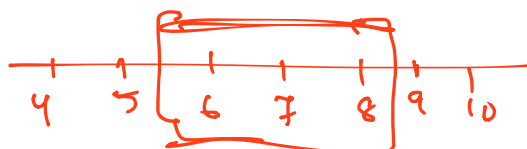
$\Rightarrow F(3)$



g. $P(5 < X < 9)$

$\Rightarrow F(10) - F(4)$
 $F(10) - F(5)$

$P(6) + P(7) + P(8)$
 $F(8) - P(5)$



The CDF of a random variable is given below.

x	1	2	3	4	5	6	7	8
F(x)	.08	.15	.26	.43	.78	.82	.88	1.00

Determine a) $P(X < 5)$ b) $P(X \leq 3)$ c) $P(6 \leq X)$

$\Rightarrow \underline{F(4)}$
 $\quad F(3)$
 $\quad 1 - F(5)$

d) $P(2 \leq X)$

e) $P(3 \leq X < 7)$

f) $P(3 < X \leq 7)$

g) $P(X \leq 4)$

$1 - F(1)$

$F(6) - F(2)$

$F(7) - F(3)$

$\underline{F(4)}$

20. Determine the value(s) of c that makes the table below a CDF.

x	1	2	3	4	5	6	7	8
F(x)	.2	.25	.45	.55	c	.87	.95	1.00

\Rightarrow

\uparrow
 $P(1) + P(2) + P(3) + P(4)$

$\underline{P(5)}$

≈ 0.072

$\underline{0.55} < c < \underline{0.87}$

21. Determine the value(s) of c that makes the table below a CDF.

x	1	2	3	4	5	6	7	8
F(x)	.1	.25	.46	c	.71	.72	.86	1.00

$\Rightarrow \boxed{0.46 < c < 0.71}$

CDF Notation

$$P(7 \leq x < 14) = F(13) - F(6)$$

$$X \quad P(\underline{8 \leq x}) = 1 - F(7)$$

$$\checkmark P(x \geq 8) = 1 - F(7)$$

$$P(\underline{x \leq 7}) = F(7)$$

$$P(\underline{x = 8}) = F(8) - F(7)$$

$$\underline{P(x = (7, 8))} \Rightarrow P(6 < x < 9) =$$

$$F(8) - \underline{F(6)}$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ P(7) \text{ to } P(8) & & P(7) \text{ to } P(6) \\ \underbrace{\hspace{10em}} & & \\ P(7) + P(8) & & \end{array}$$