Cumulative Distribution Function Video

Start of transcript. Skip to the end.

- Hello and welcome back.

In the last video, we started talking about random variables

and now we want to talk about some type of events,

that we might be interested in for random variables

and how we can calculate the probabilities easier

and we'll do that using cumulative distribution functions.

So, when we talk about random variables,

7.2_Cumulative_Distribution_Function

POLL
All cumulative distribution functions are:

RESULTS

Right continuous.	**70%**
Continuous.	**16%**
None of the above.	**10%**
Left continuous.	**5%**

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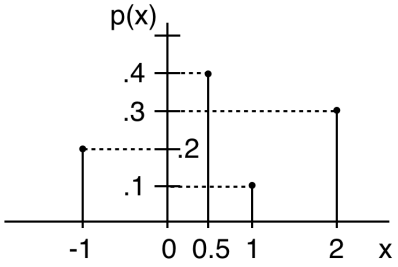
Results gathered from 244 respondents.

FEEDBACK
All cdf's are right continuous.

1

2.0/3.0 points (graded)
For the probability mass function



Find:

- $P(X = 1)$,

0.1 ✔ **Answer:** 0.1

0.1

Explanation
$P(X = 1) = 0.1$ from the figure.

- $P(X \geq 1)$,

0.4 ✔ **Answer:** 0.4

0.4

Explanation
$P(X \geq 1) = P(X = 1) + P(X = 2) = 0.4$

- $P(X \in \mathbb{Z})$.

0.4 ✖ **Answer:** 0.6

0.4

Explanation
$P(X \in \mathbb{Z}) = P(X = -1) + P(X = 0) + P(X = 1) + P(X = 2) = 0.6$

Submit You have used 4 of 4 attempts

Answers are displayed within the problem

2

3/4 points (graded)
Recall that the "floor" of a real number x, denoted $\lfloor x \rfloor$, is the largest interger $\leq x$.

$F(x) = \begin{cases} k - \frac{1}{\lfloor x \rfloor}, x \geq 1, \\ 0, x < 1, \end{cases}$ is a cummulative distribution function (cdf) for some fixed number k. Find:

- k,

1 ✔ **Answer:** 1

1

Explanation
Recall that $F(\infty) = 1$. Here $F(\infty) = k$, hence $k = 1$.

- $x_{\min}$ (the smallest number with non-zero probability),

2 ✔ **Answer:** 2

2

Explanation
Observe that $F(x) = 0$ for $x < 1$, and since $k = 1$, also $F(1) = 0$, hence the smallest number with non-zero probability is 2.

- $P(X = 4)$,

0.75 ✖ **Answer:** 1/12

0.75

Explanation
$P(X = 4) = F(4) - F(3) = \frac{3}{4} - \frac{2}{3} = \frac{1}{12}$

- $P(2 < X \leq 5)$.

0.3 ✔ **Answer:** 3/10

0.3

Explanation
$P(2 < X \leq 5) = F(5) - F(2) = \frac{4}{5} - \frac{1}{2} = \frac{3}{10}$

Submit You have used 4 of 4 attempts

Answers are displayed within the problem

3

0 points possible (ungraded)
Flip a coin with heads probability 0.6 repeatedly till it lands on tails, and let X be the total number of flips, for example, for h, h, t, $X = 3$. Find:

- $P(X \leq 3)$,

544 ✖ **Answer:** 0.784

544

Explanation
$P(X \leq 3) = P(X = 1) + P(X = 2) + P(X = 3) = 0.4 + 0.6 \times 0.4 + 0.6 \times 0.6 \times 0.4 = 0.784$

- $P(X \geq 5)$.

✖ **Answer:** 0.1296

Explanation
$P(X \geq 5) = 1 - P(X < 5) = 1 - P(X \leq 4) = 1 - (P(X \leq 3) + P(X = 4)) = 1 - (P(X \leq 3) + 0.6 \times 0.6 \times 0.6 \times 0.4) =$
.

Submit You have used 4 of 4 attempts

Answers are displayed within the problem

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1