Ex. 2. Probability distribution for discrete random variables

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For discrete random variable X, $F(x) = P(X \leq x)$.

For discrete random variable X, $EX = \sum_i x_i p_i = m$.

For discrete random variable X, $D^2(X) = \sum_i (x_i - m)^2 p_i \vee D^2(X) = E(X^2) - (EX)^2$

$P(X \leq x) = \lim_{k \to x^+} F(k) = F(x+)$

$P(X > x) = 1 - F(x+)$

$P(X < x) = F(x)$

$P(X = x) = F(x+) - F(x)$

$P(a \leq X < b) = F(b) - F(a)$

$P(a < X \leq b) = F(b) - F(a) + P(X = b) - P(X = a)$

$P(a \leq X \leq b) = F(b) - F(a) + P(X = b)$

$P(a < X < b) = F(b) - F(a) - P(X = a)$

Task 1. A die is tossed. Let x be the number of spots observed on the upturned face of the die.

   a) Find the probability distribution of x and display it in the tabular and graphical form.

   b) Find the cumulative disribution function and display it in the tabular and graphical form.

   c) Find the expectation of X and the variance of X.

   d) Find $P(1 \leq X < 4), P(X > 3), P(1 < X < 3), P(X = 4)$.

Task 2. Three fair coins are tossed. Let x be the numer of heads.

   a) Find the probability distribution of x and display it in the tabular and graphical form.

   b) Find the cumulative distribution function and display it in the tabular and graphical form.

   c) Find the expectation of X and the variance of X.

   d) Find $P(1 \leq X < 4), P(X > 3), P(1 < X < 3)$.

Task 3. Probability distribution of accidents at work during one day is shown in the table.

   a) What is the variable X?

   b) Find the cumulative disribution function and display it in the tabular and graphical form.

   c) Find the expectation of X and the variance of X.

   d) Find $P(2 < X \leq 4), P(X < 3), P(X \geq 1)$.

x	0	1	2	3	4	5
p	0.02	0.18	0.28	0.25	0.2	0.07