

Assignment-6

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July 9, 2022

Question

Papoulis book exercise 5

Q-15 A fair coin is tossed 10 times and x equals the number of heads.

(a) Find $F_x(x)$.

(b) Find $F_y(y)$ if $y = (x - 3)^2$.

Solution

(a) The random variable x takes the value $k = 0, 1, 2, \dots, 10$ and

$$P(x = k) = p_k = \binom{10}{k} \frac{1}{2^{10}} \quad 0 \leq k \leq 10$$

$F_x(x)$ is a staircase function with discontinuities at the points $x = k$ and jumps equal to P_k .

Solution

(b) The random variable $y = (x - 3)^3$ takes the value $y = k^2$ for $k = 0, 1, \dots, 7$ and probabilities $P\{y = k^2\} = q_k$.

$k =$	0	1	2	3	4	5	6	7
$q_k =$	p_3	$p_2 + p_4$	$p_1 + p_5$	$p_0 + p_6$	p_7	p_8	p_9	p_{10}