Probability functions and cumulative probabilities

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. For probabilities 0.2, 0.5 and 0.3 at x = 0, 1, 2, give F(0), F(1) and F(2). [3 marks]

Take running totals: 0.2; 0.2 + 0.5; 0.2 + 0.5 + 0.3.

Answer: 0.2, 0.7, 1.

2. For the same distribution, find P(X < 2). [2 marks]

The event includes x = 0 and x = 1 only.

Add 0.2 + 0.5.

Answer: 0.7.

3. An integer-valued X has F(2) = 0.65 and F(3) = 0.90. Find P(X = 3). [2 marks]

Subtract the cumulative total before 3 from the total at 3.

0.90 − 0.65 = 0.25.

Answer: 0.25.

4. X takes only the values 2, 5 and 8, with probabilities 0.1, 0.6 and 0.3. Find F(6). [2 marks]

The values no larger than 6 are 2 and 5.

Add 0.1 + 0.6; there need not be mass at 6.

Answer: 0.7.

5. For integer-valued X, F(1) = 0.3 and F(4) = 0.95. Find P(2 ≤ X ≤ 4). [2 marks]

F(4) includes all values up to 4.

Subtract F(1), which excludes everything below 2: 0.95 − 0.3.

Answer: 0.65.

6. A proposed cumulative function has F(1) = 0.7 and F(2) = 0.6. Explain why it is impossible. [2 marks]

The event X ≤ 1 is contained in X ≤ 2.

Adding possible values cannot reduce total probability.

Answer: A cumulative probability cannot decrease.