1 Lesson 10 Additional Exercise 1

In college basketball, when a player is fouled while not in the act of shooting and the opposing team is "in the penalty," the player is awarded a "1 and 1." In the 1 and 1, the player is awarded one free throw, and if that free throw goes in, the player is awarded a second free throw. Find the p.m.f. of Y, the number of points scored in a 1 and 1 given that any free throw goes in with probability 0.7, independent of any other free throw.

2 Answer

2.1 Probability Mass Function of Y

Let Y be the number of points scored in a "1 and 1" situation in college basketball. The p.m.f. of Y is calculated as follows:

2.2 Calculation of the Probability Mass Function

- $P(Y = 0)$: The player misses the first free throw, so no points are scored.

$$P(Y = 0) = P(\text{Miss the first free throw}) = 1 - 0.7 = 0.3$$

- $P(Y = 1)$: The player makes the first free throw but misses the second, so 1 point is scored.

$$P(Y = 1) = P(\text{Make the first free throw}) \times P(\text{Miss the second free throw}) = 0.7 \times 0.3 = 0.21$$

- $P(Y = 2)$: The player makes both free throws, so 2 points are scored.

$$P(Y = 2) = P(\text{Make the first free throw}) \times P(\text{Make the second free throw}) = 0.7 \times 0.7 = 0.49$$

2.3 Summary of the Probability Mass Function

The p.m.f. of Y, the number of points scored in a "1 and 1" situation, is as follows:

$$P(Y = 0) = 0.3$$
$$P(Y = 1) = 0.21$$
$$P(Y = 2) = 0.49$$

2.4 Graph of the p.m.f. of Y