Answer on Question #82514 – Math – Statistics and Probability

Question

A player tosses two fair coins. He wins Rs.100/- if head appears, Rs.200/- if two heads appear. On the other hand he loses Rs.500/- if no head appears. Determine the expected value E of the game and is the game favorable to the player?

Solution

Note that

$$P(no\ head) = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$$

$$P(2\ heads) = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$$

$$P(1\ head) = 2\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{2}$$

As there are 2 possible ways that 1 head appears, as there are 2 coins.

Thus, consider the table:

x_i (amount won)	$P(x_i)$	$x_i P(x_i)$
100	½	50
200	¼	50
-500	¼	-125

Thus, the expected value is

$$E(x) = \sum x_i P(x_i) = 50 + 50 + (-125)$$

$$E(x) = -25$$

As this value is negative, then the game is not favorable to the player.

Answer: $E(x) = -25$, the game is not favorable to the player.