Answer on Question #81422 – Math – Statistics and Probability

Question

A fair coin is tossed three times and a T (for tails) or H (for heads) is recorded, giving us a list of length 3. Let X be the random variable which is zero if no T has another T adjacent to it, and is one otherwise. Let Y denote the random variable that counts the number of $T's$ in the three tosses. Find $P(X = 1, Y = 2)$.

A) 1/8
B) 2/8
C) 5/8
D) 7/8

Solution

When a fair coin is tossed 3 times, the outcomes are

$$\{TTT, TTH, THT, THH, HTT, HTH, HHT, HHH\}$$

$X = 1$ implies there is a T adjacent to a T and $Y = 2$ implies there are two T
There are two outcomes satisfying this: TTH, HTT
Hence,

$$P(X = 1, Y = 2) = 2/8.$$

Answer: B) 2/8.