Answer on Question #71243 – Math – Statistics and Probability

Question

Let t be a random variable giving the number of heads plus the number of tails in three tosses of a coin. List the elements of the sample space S for the three tosses of the coin and assign a value to each sample point.

Solution

The sample space S for the three tosses of the coin is:

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

For 3 tosses, possibilities are:

$HHH: 3\ heads\ and\ 0\ tails => t = (heads + tails = 3 + 0 = 3)$

$HHT: 2\ heads\ and\ 1\ tail => t = (heads + tails = 2 + 1 = 3)$

$HTH: 2\ heads\ and\ 1\ tail => t = (heads + tails = 2 + 1 = 3)$

$HTT: 1\ head\ and\ 2\ tails => t = (heads + tails = 1 + 2 = 3)$

$THH: 2\ heads\ and\ 1\ tail => t = (heads + tails = 2 + 1 = 3)$

$THT: 1\ head\ and\ 2\ tails => t = (heads + tails = 1 + 2 = 3)$

$TTH: 1\ head\ and\ 2\ tails => t = (heads + tails = 1 + 2 = 3)$

$TTT: 0\ heads\ and\ 3\ tails => t = (heads + tails = 0 + 3 = 3)$

$Sample\ points$	t
HHH	3
HHT	3
HTH	3
HTT	3
THH	3
THT	3
TTH	3
TTT	3

$$P(t = 3) = P(HHH) + P(HHT) + P(HTH) + P(HTT) + P(THH) + P(THT) + $$
$$+P(TTH) + P(TTT) =$$
$$= \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) +$$
$$+ \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = 8\left(\frac{1}{8}\right) = 1$$