Answer on question #44689 – Math - Statistics and Probability

Suppose that 50% of all babies born in a particular hospital are girls. If 6 babies born in the hospital are randomly selected, what is the probability that fewer than 3 of them are girls?

Solution

It's an example of a binomial experiment.
Let p – probability that baby is a girl, q – probability that baby is a boy.
So:
$p = 0.5$ - baby is a girl.
$q = 1 - 0.5 = 0.5$ - baby is a boy.
We have 6 trials. To calculate the probability “fewer than 3”, we need to add probabilities that 0, 1 and 2 babies are girls:

$$P(X < 3) = P(X = 0) + P(X = 1) + P(X = 2)$$

$$P(X = 0) = \binom{6}{0} \cdot p^0 \cdot q^6 = 0.015625$$

$$P(X = 1) = \binom{6}{1} \cdot p^1 \cdot q^5 = 0.09375$$

$$P(X = 2) = \binom{6}{2} \cdot p^2 \cdot q^4 = 0.234375$$

So answer is:

$$P(X < 3) = 0.015625 + 0.09375 + 0.234375 = 0.34375$$

Answer

$$P(X < 3) = 0.34375.$$