Answer on Question #62743 – Math – Statistics and Probability

Question

1. In a rabbit family with four offspring, find the probability that there will be at least 1 male and 1 female in the offspring.

Solution

Number of possible outcomes:
$$n = 2^4 = 16.$$
Only two of them have all males or all females and do not meet the criterion.
So the probability that there will be at least 1 male and 1 female in the offspring will be
$$P = \frac{16 - 2}{16} = \frac{14}{16} = \frac{7}{8} = 0.875.$$

Answer: 0.875.

Question

2. The probability that a trap will catch a rodent is 0.4. what is the probability that out of 5 traps set within a certain forest, at least
   (a) 1 will catch a rodent,
   (b) all will catch a rodent.

Solution

Catching follows the binomial distribution with parameters $p = 0.4$ and $n = 5$.
(a) $P(X \geq 1) = 1 - P(X = 0) = 1 - (1 - p)^5 = 1 - 0.6^5 = 0.9222$
(b) $P(X = 5) = p^5 = 0.4^5 = 0.0102$
Answer: **(a)** 0.9222; **(b)** 0.0102.

Question

3. In a fishing region, if the two standard Norman point are identified as z1 and z2. what is the area under the standard normal curve between z1=0.81 and z2=1.94?

$$P(0.81 < Z < 1.94) = P(Z < 1.94) - P(Z < 0.81) = 0.9738 - 0.7910 =$$
$$= 0.1828.$$

Answer: 0.1828.

Question

4. if 20% of patient being treated with a type of malaria drug suffered a bad reaction, find the probability in the treatment of 10 patients, 2 will suffer a bad reaction.

Solution

Occurrence of a bad reaction follows the binomial distribution with parameters $p = 0.2$, $n = 10$.
The probability that 2 will suffer a bad reaction is given by the following formula:

$$P(X = 2) = \binom{10}{2} 0.2^2 (1 - 0.2)^8 = \frac{10!}{2!8!} 0.2^2 (1 - 0.2)^8 = 0.3020.$$

Answer: 0.3020.

Question

5. In measuring the height of some rabbit, the mean was 72, and the standard deviation was 15. Calculate the standard height of rabbits having a height of 93.

Solution

The standard height of rabbits is

$$Z = \frac{x - \mu}{\sigma} = \frac{93 - 72}{15} = \frac{21}{15} = \frac{7}{5} = 1.4.$$

Answer: 1.4.

Question

6. If the probability of a defective syringe is 0.4, find the mean for the distribution of defective syringes in a total of 500.

Solution

Occurrence of defective syringes follows the binomial distribution with parameters $p = 0.4, n = 500$.

The mean for the distribution of defective syringes is
$$\mu = np = 500 \cdot 0.4 = 200.$$

The standard deviation for the distribution of defective syringes is
$$\sigma = \sqrt{np(1-p)} = \sqrt{500 * 0.4 * 0.6} = 10.9545.$$

Answer: 200.