Answer on Question #70066, Physics / Other

An athlete is running in four races and in each race she has a 60% chance of winning. What is the probability that she will win at least two races?

Solution:

The binomial distribution consists of the probabilities of each of the possible numbers of successes on N trials for independent events that each have a probability of p of occurring.

The formula for the binomial distribution is shown below:

$$P(x) = \frac{N!}{x!\,(N-x)!} p^x (1-p)^{N-x}$$

where P(x) is the probability of x successes out of N trials, N is the number of trials, and π is the probability of success on a given trial.

We have binomial distribution with

$$p = 0.6 \ and \ N = 4.$$
$$P(x \geq 2) = 1 - P(x = 0) - P(x = 1)$$
$$P(x = 0) = \frac{4!}{0!\,(4-0)!} 0.6^0 (1-0.6)^{4-0} = 0.0256$$
$$P(x = 1) = \frac{4!}{1!\,(4-1)!} 0.6^1 (1-0.6)^{4-1} = 0.1536$$
$$P(x \geq 2) = 1 - 0.0256 - 0.1536 = 0.8208$$

Answer: 0.8208