Examples #4

Example 0.1 (Hypergeometric Distribution)**.** In 500 independent calculations a scientist has made 25 errors. If a second scientist checks seven of these calculations randomly, what is the probability that he detects two errors? Assume that the second scientist will definitely find the error of a false calculation.

Example 0.2 (Hypergeometric Distribution)**.** In an assembly-line production of industrial robots, gearbox assemblies can be installed in 1 minute each if holes have been properly drilled in the boxes and in 10 minutes each if the holes must be redrilled. Twenty gearboxes are in stock, and it is assumed that two will have improperly drilled holes. Five gearboxes are to be randomly selected from the 20 available for installation in the next five robots in line.

(a) Find the probability that all five boxes will fit properly.

(b) Find the expected value, variance, and standard deviation of the time it takes to install these five gearboxes.

Example 0.3 (Negative Binomial Distribution)**.** Sharon and Jane play a series of backgammon games until one of them wins five games. Suppose that the games are independent and the probability that Sharon wins a game is .58.

(a) Find the probability that the series ends in seven games.

(b) If the series ends in seven games, what is the probability that Sharon wins?