Answer on Question #72624, Math / Statistics and Probability.

Task. Among 150 IRS employees in a large city, only 30 are women. If 10 of the employees are chosen at random to provide free tax assistance for the residents of this city, use the binomial approximation to the hypergeometric distribution to find the probability that at least 3 women are selected.

Solution.   This problem requires the binomial approximation to the hypergeometric, as stated in the problem statement. So, $N = 150$ employees, $k = 30$ women and $n = 10$. Then $p = \dfrac{30}{150} = \dfrac{1}{5} = 0.2$. We find $P(X \geq 3)$.

So,

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

$$= 1 - (C(10,0) \cdot 0.2^0 \cdot (1 - 0.2)^{10-0} + C(10,1) \cdot 0.2^1 \cdot (1 - 0.2)^{10-1} + C(10,2) \cdot 0.2^2 \cdot (1 - 0.2)^{10-2}) =$$

$$= 1 - (1 \cdot 1 \cdot 0.8^{10} + 10 \cdot 0.2 \cdot 0.8^9 + 45 \cdot 0.2^2 \cdot 0.8^8) =$$

$$= 1 - (0.107374 + 0.268435 + 0.301990) = 1 - 0.6778 = 0.3222$$

Answer: 0.3222.