Answer on Question #81530, Math / Statistics and Probability

A class contains a total of 8 female students and 12 male students. Four students are selected to serve in a committee.
(a) Find the probability that exactly two female students are serving in this committee.
(b) Find the probability that at least one male student is serving in this committee.

Solution

The total number of possible outcomes is $\binom{20}{4} = \frac{20!}{4!16!} = \frac{20 \cdot 19 \cdot 18 \cdot 17}{24} = 4845$.

(a) There are $\binom{8}{2} = \frac{8!}{2!6!} = \frac{7 \cdot 8}{2} = 28$ ways to choose 2 female students in a committee and $\binom{12}{2} = \frac{12!}{2!10!} = \frac{11 \cdot 12}{2} = 66$ ways to choose 2 male students in a committee. Totally there are $28 \cdot 66 = 1848$ ways. The probability is
$\frac{1848}{4845} = 0.3814$.

(b) The event is opposite to the event that there are no male students in the committee:
P({at least one male student})=1-P({no male students})
If there are no male students all students are female – there are
$\binom{8}{4} = \frac{8!}{4!4!} = \frac{5 \cdot 6 \cdot 7 \cdot 8}{24} = 70$
ways.
Then
P({at least one male student})=$1 - \frac{70}{4845} = 0.9856$

Answer provided by https://www.AssignmentExpert.com