

7.4 Hypergeometric Distribution

Worksheet 5.1w2

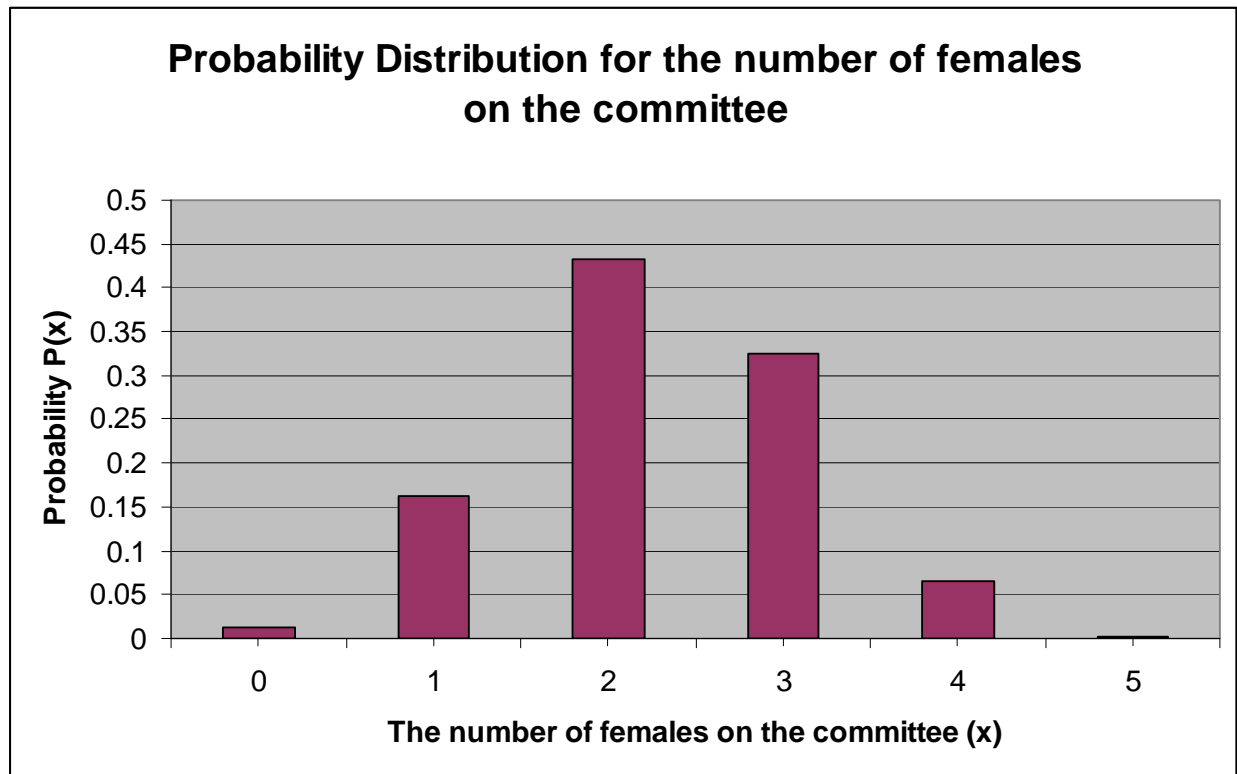
1a) X = the number of females on the committee

$$X \{0,1,2,3,4,5\}$$

b)

X	$P(X=x)$
0	$P(X=0)=P(0)$ $=C(6,5)C(5,0)/C(11,5)$ $=6/462=0.0129$
1	$P(1)$ $=C(6,4)C(5,1) / C(11,5)$ $=75/462=0.1623$
2	$P(2)$ $=C(6,3)C(5,2)/C(11,5)$ $=200/462=0.4329$
3	$P(3)$ $=C(6,2)C(5,3)/C(11,5)$ $=150/462=0.3246$
4	$P(4)$ $=C(6,1)C(5,4)/C(11,5)$ $=30/462=0.0649$
5	$P(5)$ $=C(6,0)C(5,5)/C(11,5)$ $=1/462=0.00216\dots$ $=0.0022$

c) see excel file



d) $P(x \geq 1) = 1 - P(0)$
 $= 1 - 6/462 = 462-6/462 = 456/462$
 $= 0.98701\dots$
 $= 0.9870 = 98.7\%$

e) the sum of $xP(x) = E(x)$

X	P(X=x)	xP(x)
0	$P(X=0)=P(0)$ $=C(6,5)C(5,0)/C(11,5)$ $=6/462=0.0129$	=0
1	$P(1)$ $=C(6,4)C(5,1)/C(11,5)$ $=75/462=0.1623$	=75/462
2	$P(2)$ $=C(6,3)C(5,2)/C(11,5)$ $=200/462=0.4329$	$=2 \times 200/462$ $=400/462$
3	$P(3)$ $=C(6,2)C(5,3)/C(11,5)$ $=150/462=0.3246$	=450/462
4	$P(4)$ $=C(6,1)C(5,4)/C(11,5)$ $=30/462=0.0649$	$=4 \times 30/462$ $=120/462$
5	$P(5)$ $=C(6,0)C(5,5)/C(11,5)$ $=1/462=0.00216\dots$ $=0.0022$	=5/462
		Sum=1050/462 $=2.2727\dots$ $=2.27$

Therefore, the expected number of females on the committee is 2.27 females.

7.4 Hypergeometric Distribution

Refer to question #1 on 5.1w2 worksheet

$r = 5$ = the number of people on the committee

r = the number of trials

$a = 5$ = the number of females to choose from

a = the number of successful objects

$n = 11$ = the total number of people regardless of gender

n = the sample space = the total number of possible objects

Expected value for Hypergeometric Distribution

$$E(X) = ra/n = 5(5)/11 = 25/11 =$$

$$\text{Sum} = 1050/462$$

$$= 2.2727\dots$$

Probability for Hypergeometric Distribution

Row

5	$P(5)$ $= C(5,5)C(6,0)/C(11,5)$ $= 1/462 = 0.00216\dots$ $= 0.0022$	$= 5/462$
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$$P(X=x) = \frac{C(a,x)C(n-a,r-x)}{C(n,r)}$$