STAT 347 HW3

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September 25, 2021

3.38
- **a** $P(Y = y) = C(4, y)(1/3)^y(2/3)^{4-y}$
- **b** $P(Y \geq 3) = P(3) + P(4) = C(4, 3)(1/3)^3(2/3)^1 + C(4, 4)(1/3)^4(2/3)^0 = 1/9$
- **c** $4 * 1/3 = 4/3$
- **d** $4 * (1/3) * (2/3) = 8/9$

3.40 Looking at appendix 3 table 1 for $p = 0.8$ and $n = 20$

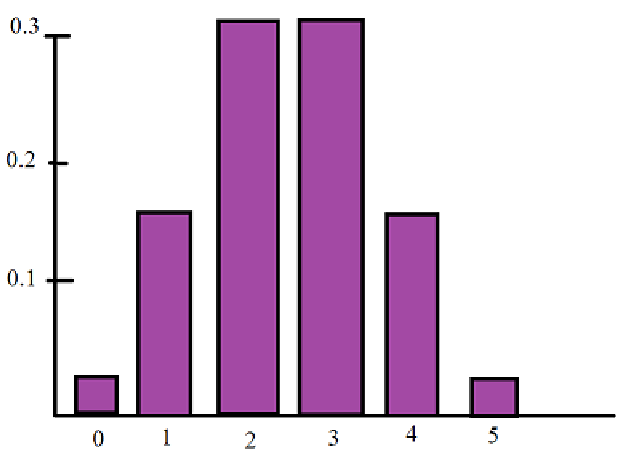
$C(20, 14)(0.8)^{14}(0.2)^6$

- **b** $P(Y \leq 9)$. $P(Y \geq 10) = 1-P(Y \leq 9) = 1-0.001 = 0.999$. Or $1-\sum_{y=0}^{9} C(20, y)(0.8)^y(0.2)^{20-y}$
- **c** $P(Y \leq 18) - P(Y \leq 13) = 0.931 - 0.087 = 0.844$. Or $\sum_{y=14}^{18} C(20, y)(0.8)^y(0.2)^{20-y}$
- **d** $P(Y \leq 16) = 0.589$. Or $1 - \sum_{y=17}^{20} C(20, y)(0.8)^y(0.2)^{20-y}$

3.41 Looking at appendix 3 table 1 for $n = 15$, $p = 0.2$
$P(Y \geq 10) = 1 - P(Y \leq 9) =\sim 0$. Or $\sum_{y=10}^{15} C(15, y)(0.2)^y(0.8)^{15-y}$

3.44
- **a** $0.8^5 = 0.3277$
- **b** $C(5, 4)(0.6)^4(0.4)$
- **c** $C(5, 1)(0.6)(0.4)^4 + C(5, 2)(0.6)^2(0.4)^3$

3.46 Using appendix 3 table 1 as suggested:



3.60 **a** $C(20,14)(0.8)^{14}(0.2)^6$

b $\sum_{y=10}^{20} C(20,y)(0.8)^y(0.2)^{20-y}$

c $1-\sum_{y=17}^{20} C(20,y)(0.8)^y(0.2)^{20-y}$

d $\sigma^2 = 20(1/5)(4/5) = 80/25 = 16/5$, $E(Y) = 20(0.8) = 16$

3.66 **a**

$$\begin{aligned}\sum_y p(y) &= \sum_{y=1}^{\infty} q^{y-1}p \\ &= p\sum_{y=1}^{\infty} q^{y-1} \\ &= p\sum_{y=0}^{\infty} q^{y} \\ &= p\frac{1}{1-q} \\ &= p\frac{1}{1-(1-p)} \\ &= p\frac{1}{p} \\ &= 1\end{aligned}$$

b 0, because p(y) decreases as y increases

3.70 **a** $(0.2)(0.8)^2$

b 0.8^{10}

3.73 **a** $(0.9)(0.1)^2$

b $0.9\sum_{y=3}^{\infty}(0.1)^{y-1} = 0.9\frac{0.01}{1-0.1} = 0.9\frac{0.01}{0.9} = 0.01$

3.81 $1/(0.5) = 2$

3.90 $C(10-1,3-1)(0.6)^7(0.4)^3$

3.97 **a** $(0.8)^2(0.2)$

b $C(7-1,3-1)(0.8)^4(0.2)^3$

c We assume that every drill probability is independent, the same, and follows a negative binomial probability.

d $E(Y) = 3/0.2 = 15$, $V(Y) = 3(0.8)/(0.2)^2 = 60$