MAT 2379 - Spring 2011
Assignment 2 : Solutions

3.27 (5 points) This question deals with the binomial distribution with parameters $n = 4, p = 0.42$ (a) $P(Y = 0) = {}_4C_0(0.42)^0 (1 - 0.42)^4 = 0.1132$

(b) $P(Y = 1) = {}_4C_1(0.42)^1 (1 - 0.42)^3 = 0.3278$

(c) $P(Y = 2) = {}_4C_2(0.42)^2 (1 - 0.42)^2 = 0.3560$

(d) $P(0 \leq Y \leq 2) = P(Y = 0) + P(Y = 1) + P(Y = 2) = 0.7970$

(e) $P(0 < Y \leq 2) = P(Y = 1) + P(Y = 2) = 0.6838$

3.28 (4 points) This question deals with the binomial distribution with parameters $n = 20, p = 0.90$

(a) $P(Y = 20) = {}_{20}C_{20}(0.90)^{20} (1 - 0.90)^0 = 0.1216$

(b) $P(Y = 19) = {}_{20}C_{19}(0.90)^{19} (1 - 0.90)^1 = 0.2702$

(c) $P(Y = 18) = {}_{20}C_{18}(0.90)^{18} (1 - 0.90)^2 = 0.2852$

(d) 90% of 20 is 18. Hence the probability as in (d) is 0.2852

3.31 (4 points)

On average there are 105 males to every 100 females. Hence, $P(male) = \frac{105}{205}$ and $p = P(female) = \frac{100}{205}$. We use the binomial with $n = 4$ and where we identify "success" as "female".

(a) $P(Y = 2) = {}_4C_2(\frac{100}{205})^2 \left(1 - \frac{100}{205}\right)^2 = 0.3746$

(b) $P(Y = 0) = {}_4C_0(\frac{100}{205})^0 \left(1 - \frac{100}{205}\right)^4 = 0.0688$

(c) We can have either 4 females or 4 males. Hence, we need $P(Y = 0) + P(Y = 4)$.

$P(Y = 4) = {}_4C_4(\frac{100}{205})^4 \left(1 - \frac{100}{205}\right)^0 = 0.0566$. Therefore,

$P(Y = 0) + P(Y = 4) = 0.0688 + 0.0566 = 0.125\,4$

3.39 (2 points)

We read from the table

(a) $P(Y = 1) = 36/100 = 0.36$; (b) $P(Y \geq 2) = \frac{14+4+1}{100} = \frac{19}{100} = 0.19$

3.42 (3 point) This question deals with the binomial distribution with parameters $n = 5, p = 0.50$

(a) ${}_5C_2 (0.50)^2 (1 - 0.50)^3 = 0.3125$

(b)

$$\begin{aligned} P(Y \geq 3) &= P(Y = 3) + P(Y = 4) + P(Y = 5) \\ &= {}_5C_3 (0.50)^3 (1 - 0.50)^2 + {}_5C_4 (0.50)^4 (1 - 0.50)^1 + \\ {}_5C_5 (0.50)^5 (1 - 0.50)^0 &= 0.5 \end{aligned}$$

3.46 (3 points)We read from the graph

(a) $P\,(120 < Y < 160) = 0.41 + 0.25 = 0.66$

(b)$P\,(Y < 120) = 0.01 + 0.20 = 0.21$

(c) $P\,(Y > 140) = 0.25 + 0.09 + 0.04 = 0.38$

Total= 21 points