Mat 2377

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Solution 3 on (33)
3.2 (3*points*)
For $n = 5, p = 3/4$
a) $P(X = 2) = \binom{5}{2}\left(\frac{3}{4}\right)^2\left(\frac{1}{4}\right)^3 = 0.0879$
b) $P(X \leq 3) = 1 - P(X = 4) - P(X = 5) = 0.3672$
3.8 (2*points*)From Table A.1 with $n = 9, p = 0.25$
$P(X < 4) = 0.8343$
3.18 (2*points*) $n = 8, p = 0.60$
(a) $P(X = 6) = \binom{8}{6}(0.60)^6(0.40)^2 = 0.2090$
(b) $P(X = 6)$=F(6) $- F(5) = 0.8936 - 0.6846 = 0.2090$
3.26 (3*points*)This is an acceptance sampling inspection scheme using the hypergeometric pmf.
(a) $P(X = 0) = \frac{77}{115}$
(b) $P(X = 1) = \frac{3}{25}$
3.52 (3*points*) a) $\lambda t = 2$ $P(X \leq 1) = 0.4060$
b) $\mu = \lambda t = 2(5) = 10.P(X \leq 4) = 0.0293$
3.64 (5*points*) a) $z = \left(\frac{17-30}{6}\right) = -2.17.$
Area= $1 - 0.0150 = 0.9850$
b) $z = \left(\frac{22-30}{6}\right) = -1.33.$
Area= 0.0918
c)$z = \left(\frac{32-30}{6}\right) = -0.33.$ $z = \left(\frac{41-30}{6}\right) = 1.83.$
Area= $0.9664 - 0.6293 = 0.3371$
d) $z = 0.84$. Hence, $x = 30 + 6(0.84) = 35.04$
e) $z_1 = -1.15, z_2 = 1.15$. Hence, $x_1 = 30 + 6(-1.15) = 23.1$
$x_2 = 30 + 6(1.15) = 36.9$

3.68 $(6points)$a) $z = \left(\frac{10.075-10}{0.03}\right) = 2.5$;
$P(X > 10.075) = P(Z > 2.5) = 0.0062$
b) $z = \left(\frac{9.97-10}{0.03}\right) = -1; z = \left(\frac{10.03-10}{0.03}\right) = 1$;
$P(9.97 < X < 10.03) = P(-1 < Z < 1) = 0.8413 - 0.1587 = 0.6826$
c) $z = -1.04, x = 10 + 0.03(-1.04) = 9.969cm$
3.86 $(3points)$ $n = 200$; X= the number of no shows. $p = 0.02$
$z = \frac{3-.0.5-4}{\sqrt{200(0.02)(1-0.02)}} = -0.76$
Probability the airline overbooks the flight =
$1 - P(X \geq 3) \cong 1 - P(Z > -0.76) = 0.2236$
3.90$(3points)$a) $P(X < 1) = 4\int_0^1 xe^{-2x}dx = [-2xe^{-2x} - e^{-2x}]_0^1 = 1 - 3e^{-2} = 0.5940$
b) $P(X > 2) = 4\int_2^\infty xe^{-2x}dx = [-2xe^{-2x} - e^{-2x}]_2^\infty = 5e^{-4} = 0.0916$
3.104 $(3points)\, a)$ $\lambda = 0.2, \lambda t = 0.2(5) = 1$
From TableA.2, $F(1) = 0.7358$; Hence, $P(X > 1) = 1 - 0.7358 = 0.2642$
b) $\lambda = 0.25, \lambda t = 0.25(5) = 1.25$. We calculate this directly since it is not in the table
$P(X \leq 1) = \sum_{x=0}^{1} e^{-1.25}\frac{(1.25)^x}{x!} = 0.6446$