For Poisson, MLE = MoM, so $\hat{\lambda} = \bar{x} = 1.6438$

H_0: Poisson fits well

H_a: Poisson does not describe data

$$L = (e^{-\lambda})^{50} \cdot (\lambda e^{-\lambda})^{122} \cdot \left(\frac{\lambda^2 e^{-\lambda}}{2}\right)^{101} \cdot \left(\frac{\lambda^3 e^{-\lambda}}{3(2)}\right)^{96} = C \cdot \lambda^{600} e^{-365\lambda}$$

$$\ell = \ln C + 600 \ln \lambda - 365\lambda$$

$$\frac{\partial \ell}{\partial \lambda} = \frac{600}{\lambda} - 365 = 0, \quad \hat{\lambda} = 1.6438$$

$$P(N=0) = e^{-\lambda} = .1932, \quad P(N=1) = \lambda e^{-\lambda} = .3177, \quad P(N=2) = \frac{\lambda^2 e^{-\lambda}}{2} = .2611$$

$$P(N \geq 3) = 1 - P(N=0) - P(N=1) - P(N=2) = .228$$

$$E(N=0) = 70.518, \quad E(N=1) = 115.961, \quad E(N=2) = 95.302, \quad E(N \geq 3) = 83.22$$

$$\chi^2 = \frac{(50-70.518)^2}{70.518} + \frac{(122-115.961)^2}{115.961} + \frac{(101-95.302)^2}{95.302} + \frac{(92-83.22)^2}{83.22}$$

$$\chi^2 = 5.97 + .31 + .34 + .93$$

$$\chi^2 = 7.55$$

$df = n - k - 1$

$df = 4 - 1 - 1$

$df = 2$

n = # categories

k = # estimated parameters using data

reject up to, and including, .025 level

C