Stat 2470, 3/3 Discussion Questions Name ______________________________

Instructions: Attempt to answer these questions by reading the textbook or with online resources before coming to class on the date above.

1. What is $L(f, \lambda)$ for an exponential distribution with $x_i = \{1, 2, 4, 8\}$?

$$L(\lambda) = \lambda e^{-\lambda} \cdot \lambda e^{-2\lambda} \cdot \lambda e^{-4\lambda} \cdot \lambda e^{-8\lambda} =$$

$$\lambda^4 e^{-15\lambda}$$

2. What is $L(f, \mu, \sigma)$ for a normal distribution for $x_i = \{10, 12, 15, 18, 21, 23\}$?

$$L(\mu,\sigma) = \frac{1}{\sqrt{2\pi}\sigma} e^{-(10-\mu)^2/2\sigma^2} \cdot \frac{1}{\sqrt{2\pi}\sigma} e^{-(12-\mu)^2/2\sigma^2} \cdot \frac{1}{\sqrt{2\pi}\sigma} e^{-(15-\mu)^2/2\sigma^2} \cdot \frac{1}{\sqrt{2\pi}\sigma} e^{-(18-\mu)^2/2\sigma^2} \cdot \frac{1}{\sqrt{2\pi}\sigma} e^{-(21-\mu)^2/2\sigma^2} \cdot \frac{1}{\sqrt{2\pi}\sigma} e^{-(23-\mu)^2/2\sigma^2}$$

$$= \frac{1}{(2\pi)^3\sigma^6} e^{-\frac{1}{2\sigma^2}\left[(12-\mu)^2 + (15-\mu)^2 + (18-\mu)^2 + (21-\mu)^2 + (23-\mu)^2\right]}$$

3. What is $L(f, p)$ for a binomial distribution for 25 trials, 11 of which were successes?

$$L(p) = p^{11}(1-p)^{14}$$

4. What is $L(f, \mu)$ for a Poisson distribution for $x_i = \{12, 15, 19, 21, 22\}$?

let $\frac{1}{12! \cdot 15! \cdot 19!\, 21!\, 22!} = k$

$$L(\mu) = \frac{e^{-\mu}\mu^{12}}{12!} \cdot \frac{e^{-\mu}\mu^{15}}{15!} \cdot \frac{e^{-\mu}\mu^{19}}{19!} \cdot \frac{e^{-\mu}\mu^{21}}{21!} \cdot \frac{e^{-\mu}\mu^{22}}{22!} =$$

$$k e^{-5\mu} \mu^{69}$$

5. What is a complication of finding parameter values for a hypergeometric distribution? What can we do to get around this problem?

the maximum likelihood function for the hypergeometric distribution is discrete. even if we expand it out into factorial notation we can't take the derivative. We can get around this graphically. test the function w/ various values of the parameter and choose the one w/ the largest value.