Biology 4605/7220 Name_______Key________

Quiz #3b 25 September 2007

1\. The expected number of events k in area A, if events are rare and random, follows a Poisson distribution. The expected frequency of events Pr(X=k) for a Poisson distribution is calculated as

$$Pr(X=k) = e^{-\mu}\ \mu^{k} / k! \qquad k = 0,1,2,3\ etc$$

$$Pr(X=0) = e^{-2}\ 2^{0} / 0! \ = 0.135$$

where $\mu = \lambda$ A,
e is approximately 2.71828, any number to the zero power is 1,
and k! (k factorial) is 0! = 1, 1! = 1, 2! = 2*1, 3! = 3*2*1, *etc*.

If a laboratory population of bacteria grows at a density of $\lambda = 0.02/cm^2$, what is the probability of finding no colonies Pr(X=0) in an area of A = 100 cm^2 ?

Beneath the equation, write the equation with the numbers you plan to use. [1]

Compute the probability of finding no colonies Pr(X=0) if A = 100 cm^2 __0.135___[1]

2\. Construct the frequency distribution F(Y=k) and the cumulative relative frequency distribution RF(Y≤k) from the cumulative frequency distribution F(Y≤k) of mites found on 589 chironomid flies, where the outcomes are k = number of mites per chironomid fly (from Sokal and Rohlf 1995, Box 5.6).

k	F(Y=k)	F(Y≤k)	RF(Y≤k)	
0	442	442	442/589 = 0.75	[2]
1	91	533	0.905	[2]
2 or more	56	589	1.00	[2]

3\. If the probability of an outcome is some percentage p, then the odds in favour of the outcome are defined as Odds = p/q where q = 1 - p. The odds against that outcome are thus q/p. Odds are expressed relative to a value of 1.
Read the expression (Odds = 4: 1) as "odds are 4 to 1."

If the probability of finding an uninfected chironomid had been 30%,
what are the odds of finding an uninfected chironomid ? __0.43:1_______[1]

what are the odds of finding an infected chironomid ? __2.33:1_______[1]