Biology 4605/7220 Name_____
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

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

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 _____[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	_____	[2]
1	_____	533	_____	[2]
2 or more	_____	589	_____	[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 ? _____[1]

what are the odds of finding an infected chironomid ? _____[1]