ECO239 Quiz 2 (Nov. 24.2008)

1. For a binomial probability function with p = 0.3 and n = 10, find the probability that the number of successes is less than 2.

   $P(x<2) = P(x=0) + P(x=1)$

   $= \frac{10!}{0!10!}(0.3)^0(0.7)^{10} + \frac{10!}{1!9!}(0.3)^1(0.7)^9$

   $= (0.7)^{10} + 10*(0.3)*(0.7)^9 = 0.1493$

2. Compute the probability of successes that the number of successes are greater than 1 in a random sample of size n = 5 obtained from a population of size N = 10 that contains 5 successes.

   $P(x>1) = 1-[P(x=0)+P(x=1)] = 1- \left[\frac{C_0^5 C_5^5}{C_5^{10}} + \frac{C_1^5 C_4^5}{C_5^{10}}\right] = 1 - 26/252 = 0.8968.$

3. Determine the probability that the number of successes are exactly 2 successes for a random variable with a Poisson distribution with parameter lambda = 2.5.

   $P(x=2) = \frac{e^{-2.5}2.5^2}{2!} = 0.2526$

4. Determine the probability that the number of successes are between 1 and 2 (including 1 and 2) with parameter lambda = 2.5.

   $P(1\leq x\leq 2) = \frac{e^{-2.5}2.5^1}{1!} + \frac{e^{-2.5}2.5^2}{2!} = 0.4617.$

   Notes upon grading;
   1. Total point is 10 points.
   2. Correct formula = 0.5 point each
   3. Correct set-up of probability = 1 point each
   4. Correct insertion of numbers = 0.8
   5. Exact calculation of answers = 0.2

   Your quiz paper can be checked in my office.