ASSIGNMENT #13
(due Monday, December 5)

HOME READING: §4.3.

PROBLEM 5.7-1 (a-c) (6 pt)

Note. The DeMoivre-Laplace Approximation Theorem, that was considered in class, is a special case of the Central Limit Theorem (to be studied later).

PROBLEM A (3 pt)

In Problem 5.7-1, approximate the probabilities in (a-c) also using the Poisson Approximation Theorem. Which approximation is more accurate; explain, why?

PROBLEM 4.1-1 (a-g) (7 pt)

PROBLEM 4.1-3 (a-e) (2+2+1+1+2=8 pt)

Note. In Problems 4.1-1 and 4.1-3, start your work with arranging the joint probabilities in a two-entrance table as we had in class.

PROBLEM B (4+5=9 pt)

Consider the joint p.d.f. stated in Problem 4.1-10.

1) Find the marginal p.d.f.s of X and Y and verify by integration that they are, indeed, p.d.f.s. Do not forget to specify the ranges of X and Y (or, in other words, the supports of the marginal p.d.f.s).

2) Answer questions (a,b) of Problem 4.1-10 using these p.d.f.

In the next Problem, unlike in Problem B, do not use the marginal p.d.f.s to answer questions (a)-(e). Use only the joint p.d.f.: integrate over the proper regions in the plane for (a); for (e) analyze the support of the joint p.d.f. (it is not a square, so why are the r.v.s X and Y dependent?).

Note. Of course, if the support of the joint p.d.f. is a rectangle the r.v.s may be dependent or independent! But if it is not a rectangle, the r.v.s are dependent.

See next page please.
The following two problems appeared in an actuarial exam.

**PROBLEM C** (5 pt)

An urn contains 2 white marbles and 8 red marbles. A marble is drawn from the urn 100 times in succession with replacement. Which of the following is closest to the probability of drawing more than 75 red marbles. Explain!

A. .11 D. .87
B. .62 E. .95
C. .75

**PROBLEM D** (6 pt)

Three boxes are numbered 1, 2, and 3. For \(k = 1, 2, 3\) box \(k\) contains \(k\) blue marbles and \(5 - k\) red marbles. In a two-step experiment, a box is selected and 2 marbles are drawn from it without replacement. If the probability of selecting box \(k\) is proportional to \(k\), what is the probability that the 2 marbles drawn have different colors? Explain your answer.

A. \(\frac{17}{60}\) D. \(\frac{8}{15}\)
B. \(\frac{34}{75}\) E. \(\frac{17}{30}\)
C. \(\frac{1}{2}\)