Q

1. In answering a question on a multiple choice test, a student either knows the answer or guesses. Let p be the probability that the student knows the answer & $(1-p)$ be the prob. that the student guesses. Assume that a student who guesses at the answer will be correct with prob. $1/m$, where m is the number of multiple-choice alternatives. What is the conditional prob. that a student knew the answer to a question given that he or she answered it correctly?

Q 2. Show that the function $|x|$ in $(-1,1)$ and 0 elsewhere is a possible density function & find the corresponding distr. function.

Q 3. The joint density func. of X & Y given by:

$$f(x,y) = \begin{cases} 2e^{-x}e^{-2y} & 0<x<\infty,\ 0<y<\infty \\ 0 & \text{otherwise} \end{cases}$$

compute:

(a) $P(X>1, Y<1)$

(b) $P(X<Y)$

(c) $P(X<a)$

Q 4. A pt. X is chosen at random on a line segment AB whose middle pt. is O. Find the prob. that AX, BX & AO form sides of a triangle.

Q 5. A pt. P is chosen at random on a line segment AB of length 2a. Find the prob. that the area of the rectangle AP, PB will exceed $\frac{1}{2}a^2$.

Q 6. A random pt. (X, Y) is uniformly distr. over a circular region $x^2+y^2<a^2$. Find the marginal distr. of X & Y and the conditional distr. of Y, assuming $X=x$ where $|x|<a$.

Q 7. Paul has 4 umbrellas, some at home, some in the office. He keeps moving btn. home & office. He takes the umbrella with him only if it rains. Otherwise he leaves the umbrella in the office. If suddenly it starts raining and he leaves all umbrellas at the office, then he might get wet if he has to leave suddenly.

(a) If the prob. of rain is p, what is the prob. of Paul to get wet?

(b) If $p=0.6$, how many umbrellas should Paul have, so that the prob. of getting wet is <0.1?