Assignment 3

Pathlavath Shankar (CS21BTECH11064)

Problem (Papoulis):Chapter 6,6.71

The random variables x and y are uniform in the interval (-1,1)and independent. Find the conditional density fr(r $\mid M$) of the random variable, $r = \sqrt{X^2 + Y^2}, where M = r \leq 1$

Solution:

The mass density in the square $\mid x \mid$, $\mid y \mid$ of the xy plane equals 1/4; $hence, P(r \leq 1) = x/4 and$

$$\text{P(r}\leq r, r \leq 1) = \begin{cases} Pr = \pi r^2/4, r \leq 1 \\ \\ Pr = \pi/4, r > 1 \end{cases}$$

Fr(r$\mid M$)

$$= P(r \leq r, M)/P(r \leq 1) = \begin{cases} r^2; r \leq 1 \\ \\ 1; r > 1 \end{cases}$$

$$\text{fr(r}\mid m) = \begin{cases} 2r, r < +1 \\ \\ 0, \text{otherwise} \end{cases}$$