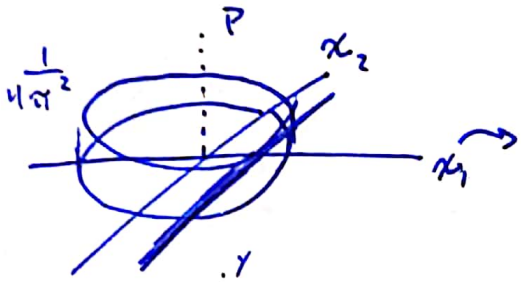
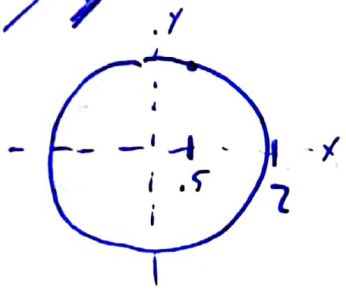
1) x_1, x_2 uniform in a circle w/ $R=2$

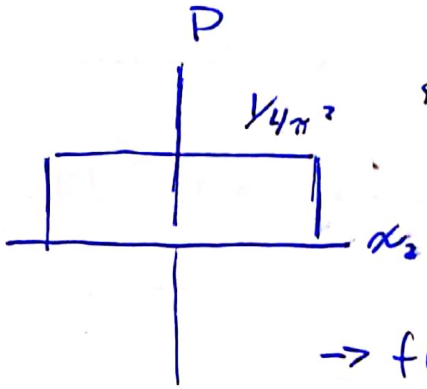
a) $f(x_1, x_2) = ?$

$$= \begin{cases} \frac{1}{4\pi^2}, & x_1^2 + x_2^2 \le 4 \\ 0, & \text{otherwise} \end{cases}$$

b) $f(x_2 \mid x_1 = 0.5)$?







still uniform, just over the rectangle defined @ $x_1 = 0.5$

$\rightarrow f(x_2 \mid x_1 = 0.5) =$

$$\begin{cases} \frac{1}{4\pi^2}, & |x_2| \le 1.9365 \\ 0, & \text{else} \end{cases}$$

$x = 0.5$, $y = ?$, $x^2 + y^2 = 4$

$\rightarrow y = 1.9365$

c) ~~Cov~~ $Cov(x_1, x_2) = E[(x_1 - \bar{x}_1)(x_2 - \bar{x}_2)] / \sigma_{x_1} \sigma_{x_2}$

x_1, x_2 symmetric about origin $\rightarrow E[\,] = 0 \rightarrow$ uncorrelated

d) $f(x_2) \neq f(x_2 \mid x_1) \rightarrow$ not independent