Please write $\mathbf{\textit{Your name:}}$ _____

Show all work. You should either write at a sentence explaining your reasoning, or annotate your math work with brief explanations. There is no need to simplify, and no calculators are needed.

....

Consider random variables X and Y given by the joint density

$$f(x,y) = \begin{cases} 3(x^2 + y^2)/4 & \text{if} \quad -1 \le x \le 1 \quad \text{and} \quad -1 \le y \le 1 \\ 0 & \text{otherwise.} \end{cases}$$

(A) Find the marginal probability density function (pdf) $f_X(x)$.

(B) Find the marginal pdf $f_Y(y)$. *Hint: the correct answer can be obtained with no extra computations based on your answer in (A).*

(C) Are X and Y independent random variables? Explain.

(D) Find $\mathbb{E}X$ and $\mathbb{E}Y$. *Hint: the correct answer is simple, and can be obtained with little or no computations, if you can explain this.*

(... more questions on the other side of the paper ...)

Consider X and Y given by the joint density

$$f(x,y) = \begin{cases} 2/9 & \text{if } 0 \leq y \leq x \leq 3 \\ 0 & \text{otherwise.} \end{cases}$$

(A) Find the marginal pdf $f_X(x)$.

(B) Find $\mathbb{E}X$.

[(*optional question for extra credit*)]: Can you find from a picture, without making a calculation, what $\mathbb{E}Y$ is?