Advanced Statistics

F22 Data Science (Afternoon) Quiz 03

Name & id:	Marks: / 50

Note: Quiz has three questions.

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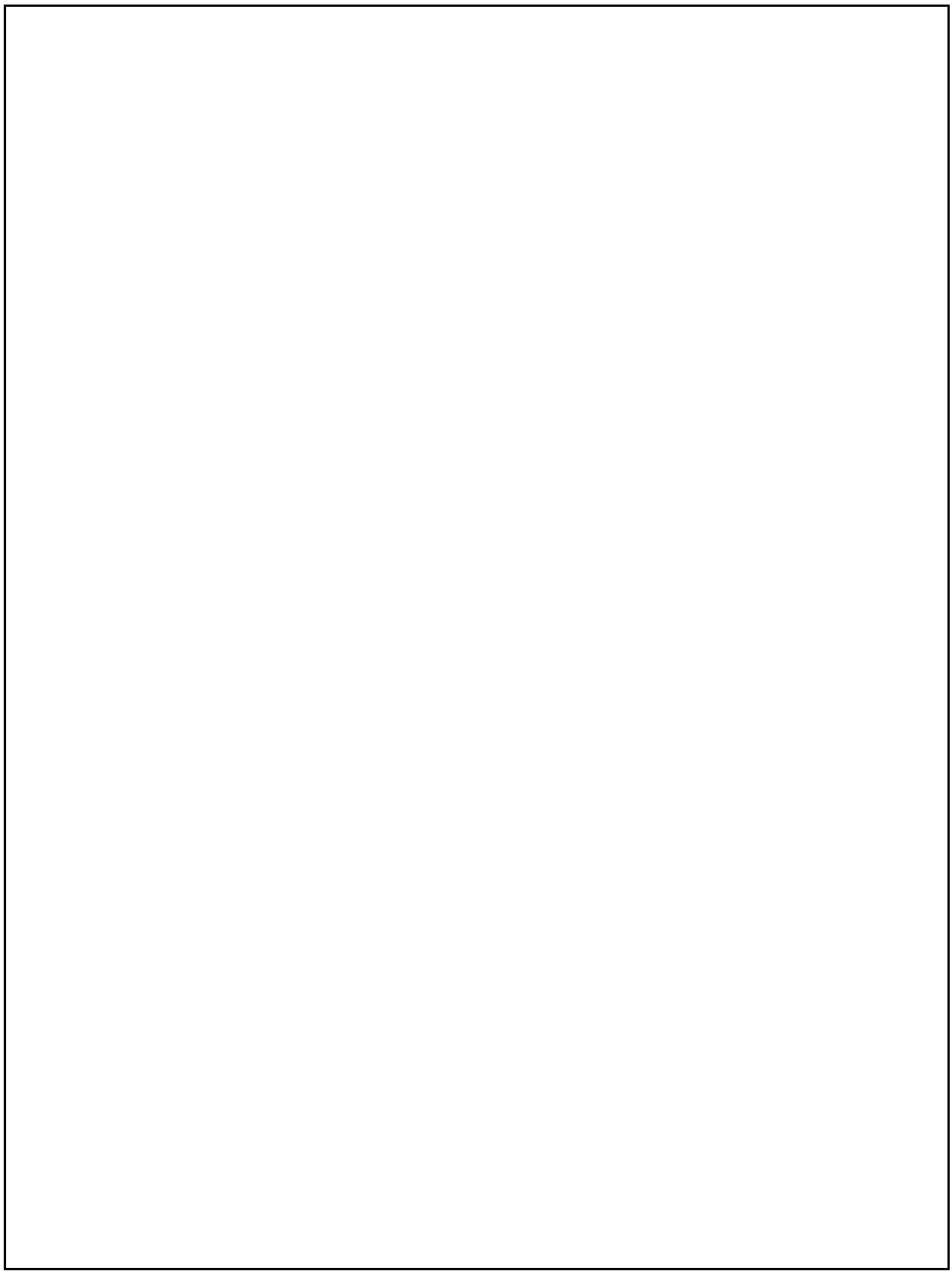
1. A fast-food restaurant operates both a drive-through facility and a walk-in facility. On a randomly selected day, let X and Y , respectively, be the proportions of the time that the drive-through and walk-in facilities are in use, and suppose that the joint density function of these random variables is

$$f(x,y) = \begin{cases} \frac{2}{3}(x+2y), 0 \le x \le 1, 0 \le y \le 1 \\ 0, elsewhere \end{cases}$$

(a) Find the marginal density of X.
(b) Find the marginal density of Y.
(c) Find the probability that the drive-through facility is busy less than one-half of the time.



2. Let X denote the reaction time, in seconds, to a certain stimulus and Y denote the temperature (˚F) at which a certain reaction starts to take place. Suppose that two random variables X and Y have the joint density

$$f(x,y) = \begin{cases} 4xy, & 0 < x < 1, 0 < y < 1, \\ 0, & elsewhere. \end{cases}$$

Find $P(0 \leq X \leq \frac{1}{2} \; and \; \frac{1}{4} \leq Y \leq \frac{1}{2})$.

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3. Suppose that X and Y have the following joint probability distribution:

		x	
	$f(x,y)$	2	4
y	1	0.10	0.15
	3	0.20	0.30
	5	0.10	0.15

(a) Find the marginal distribution of X.

(b) Find the marginal distribution of Y.