1. Consider a pair of random variables X, Y with constant joint density on the quadrilateral with vertices located at the points $(0, 0), (3, 0), (5, 2), (0, 2)$.
1a. Find $P(X \geq 3)$.
1b. Find $P(Y \geq 1)$.
1c. Find $P(\max(X, Y) \leq 1)$.

2. Suppose that X and Y have a constant joint density on the triangle with vertices $(0, 0), (3, 0), (0, 3)$.
2a. Find $P(X \leq 1)$.
2b. Find $P(Y \leq 2X)$.

3. Suppose X and Y have joint probability density function

$$f_{X,Y}(x, y) = 6e^{-3x-2y}$$

for $x > 0$ and $y > 0$; and $f_{X,Y}(x, y) = 0$ otherwise.
3a. Compute $P(Y \geq X)$.
3b. Compute $P(X \geq 2)$.
3c. Compute $P(Y \geq 5)$.

4. Suppose X, Y has joint density

$$f_{X,Y}(x, y) = \begin{cases} 1/16 & \text{if } -2 < x < 2 \text{ and } -2 < y < 2 \\ 0 & \text{otherwise} \end{cases}$$

4a. Find $P(Y \geq \frac{1}{2}X + 1)$.
4b. Find $P(|X - 1| \leq 1/2)$.

5. Suppose that X and Y have joint probability density function

$$f_{X,Y}(x, y) = \begin{cases} \frac{1}{36}(4 - x)(3 - y) & \text{if } 0 < x < 4 \text{ and } 0 < y < 3 \\ 0 & \text{otherwise} \end{cases}$$

5a. Find the probability density function $f_X(x)$.
5b. Find the probability density function $f_Y(y)$.

6a. For the random variables given in question **1**, find $P(Y \geq X)$.
6b. For the random variables given in question **5**, find $P(Y \geq X)$.