STAT 400 Discussion 5

1. Let X and Y be two jointly distributed random variables with density function
$$f(x, y) = 2e^{-x}e^{-2y}$$
where $x > 0$, $y > 0$, with probability zero outside these bounds. We would like to compute the following.

   (a) $P(X > 1, Y < 1)$

   (b) $P(X < Y)$

2. Again, let X and Y be jointly distributed random variables but now with pdf
$$f(x, y) = 3x$$
for $(0 < y < x < 1)$. First, determine if X and Y are independent, then find their covariance.

3. Similar to what was done for expected value and variance on single random variables we would like to take a look at some properties/definitions for expectation and covariance in the bivariate case using X and Y as our jointly distributed random variables and both a and b are constants.

   (a) Write out the general definition of expected value for jointly distributed random variables X and Y

   (b) $Cov(aX, bY)$

   (c) $Cov(X, X + Y)$

   (d) $Cov(aX - Y, X + bY)$