Instructions: Write complete solutions to the following problems in the space provided. Be sure to supply all the necessary steps that lead to your answers

1. Find the mass and center of mass of the lamina that occupies   Ans_____
    the region D and has the given density function ρ.
    D is the triangular region with vertices: _____
    $(0,0)$, $(2,1)$, $(0,3)$; $\rho(x,y) = 2(x+y)$

2. Find the mass and center of mass of the lamina that occupies   Ans_____
    the region D and has the given density function ρ.
    D is the triangular region enclosed by the lines: _____
    $x = 0$, $y = x$, and $2x + y = 6$; $\rho(x,y) = 2x^2$

3. A lamina occupies the part of the disk in the first quadrant.   Ans_____
    Find its center of mass if the density at any point is proportional
    to its distance from the x-axis. $x^2 + y^2 \le 4$ _____

4. Find the moments of inertia I_x, I_y, I_0 or a lamina in the   Ans_____
    shape of an isosceles right triangle with equal sides of length
    a if the density at any point is proportional to the square of   _____
    the distance from the vertex opposite the hypotenuse.
    Assume that the coefficient of proportionality is k, and that
    the lamina lies in the region bounded by $x = 0$, $y = 0$, and $y = a - x$

5. The joint density function for a pair of random variables   Ans_____
    X and Y is given.

                                                                              _____

$$f(x,y) = \begin{cases} Cx(1 + y) & if\ 0 \le x \le 1,\ 0 \le y \le 4 \\ 0 & otherwise \end{cases}$$ _____

a. Find the value of the constant C.
b. Find $P(X \le 1, Y \le 1)$
c. Find $P(X + Y \le 1)$