

MA 213 Worksheet #18

Section 15.4 15.5

10/30/18

- 1** Find the mass and center of mass of the lamina that occupies the region D and has the given density function ρ .

15.4.3 (a) $D = \{(x, y) \mid 1 \leq x \leq 3, 1 \leq y \leq 4\}; \rho(x, y) = ky^2$

15.4.9 (b) D is bounded by the curves $y = e^{-x}, y = 0, x = 0, x = 1; \rho(x, y) = xy$

- 2** 15.4.11 A lamina occupies the part of the disk $x^2 + y^2 \leq 1$ in the first quadrant. Find its center of mass if the density at any point is proportional to its distance from the x -axis.

- 3** 15.4.21 A lamina with constant density $\rho(x, y) = \rho$ occupies the rectangle $0 \leq x \leq b, 0 \leq y \leq h$. Find the moments of inertia I_x and I_y and the radii of gyration $\bar{\bar{x}}$ and $\bar{\bar{y}}$.

- 4** 15.4.23 A lamina with constant density $\rho(x, y) = \rho$ occupies the part of the disk $x^2 + y^2 \leq a^2$ in the first quadrant. Find the moments of inertia I_x and I_y and the radii of gyration $\bar{\bar{x}}$ and $\bar{\bar{y}}$.

- 5** Find the area of the surface:

15.5.1 (a) The part of the plane $5x + 3y - z + 6 = 0$ that lies above the rectangle $[1, 4] \times [2, 6]$

15.5.3 (b) The part of the plane $3x + 2y + z = 6$ that lies in the first octant.

15.5.5 (c) The part of the paraboloid $z = 1 - x^2 - y^2$ that lies above the plane $z = -2$.

15.5.9 (d) The part of the surface $z = xy$ that lies within the cylinder $x^2 + y^2 = 1$.

15.5.11 (e) The part of the sphere $x^2 + y^2 + z^2 = a^2$ that lies within the cylinder $x^2 + y^2 = ax$ and above the xy -plane.