

Math 17C
Kouba
Discussion Sheet 4

- 1.) Let R be the region bounded by the graphs of $y = x^2$ and $y = 3x$.
 - a.) Describe R using vertical cross-sections.
 - b.) Describe R using horizontal cross-sections.

- 2.) Let R be the region inside the circle of radius 5 centered at $(3, 4)$ and to the right of the line $x = 3$.
 - a.) Describe R using vertical cross-sections.
 - b.) Describe R using horizontal cross-sections.

- 3.) Let R be the triangular region with vertices $(0, 0)$, $(2, 0)$, and $(3, 2)$.
 - a.) Describe R using vertical cross-sections.
 - b.) Describe R using horizontal cross-sections.

- 4.) Let R be the region bounded by the graphs of $x = y^2$ and $x = y + 2$.
 - a.) Describe R using vertical cross-sections.
 - b.) Describe R using horizontal cross-sections.

- 5.) Sketch each of the following regions described in two-dimensional space.
 - a.) $0 \leq x \leq 3$, $2 \leq y \leq 4$
 - b.) $0 \leq x \leq 3$, $\sqrt{x} \leq y \leq x + 1$
 - c.) $1 \leq x \leq 3$, $0 \leq y \leq \ln x$
 - d.) $0 \leq y \leq \ln 3$, $e^y \leq x \leq 3$
 - e.) $0 \leq y \leq 1$, $y^2 \leq x \leq 4 - y$

- 6.) Evaluate the following double integrals.

a.) $\int_0^1 \int_{x^2}^x xy^2 dy dx$ b.) $\int_{\pi/2}^{\pi} \int_0^{x^2} (1/x) \cos(y/x) dy dx$

(Beware of the next two.)

c.) $\int_0^1 \int_{4x}^4 e^{-y^2} dy dx$ d.) $\int_0^2 \int_{y/2}^1 \cos(x^2) dx dy$

- 7.) Consider the tetrahedron with vertices $(0, 0, 0)$, $(4, 0, 0)$, $(0, 3, 0)$, and $(0, 0, 2)$.
 - a.) It's top surface is a plane. Find an equation for this plane.
 - b.) Set up but do not evaluate a double integral which represents the volume of the tetrahedron.

- 8.) Consider a flat plate lying in region R bounded by the graphs of $x = y^3$, $x = 8$, and $y = 0$. Assume that density at point (x, y) is given by $\delta(x, y) = 1 + xy$ grams per square

inch. Find the

- a.) average height of region R .
- b.) average width of region R .
- c.) average square of the distance from points (x, y) in R to the point $(0, 4)$.
- d.) total mass of the plate.
- e.) average density of the plate.

9.) Sketch the solid in 3D-Space whose volume is given by the following double integrals.

a.) $\int_0^3 \int_0^2 4 \, dy \, dx$

b.) $\int_0^2 \int_0^{4-2x} (6 - 2x - (3/2)y) \, dy \, dx$

c.) $\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} (7 - x^2 - y^2) \, dy \, dx$

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"I have always observed that to succeed in the world one should appear like a fool but be wise." – Charles de Montesquieu