

Name: \_\_\_\_\_

M344: Calculus III (Su.19)

Good Problems 5

Selections from Chapter 15



WICHITA STATE  
UNIVERSITY

---

**Instructions.** Complete all problems, showing enough work. All work must be done on this paper. You may use your own hand-written notes, but you may not use any electronic devices.

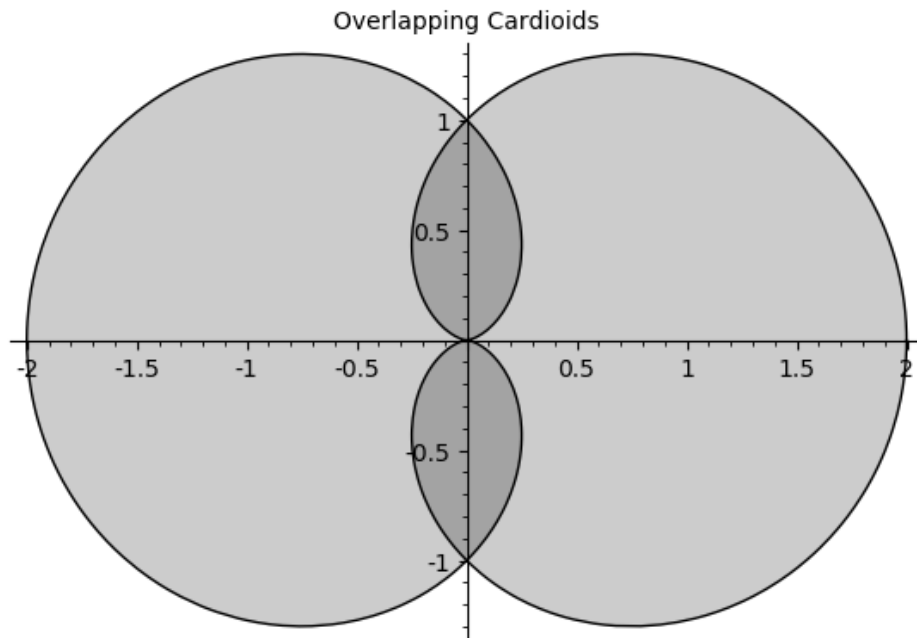
---

1. [25 points] Compute the double integral by reversing the order of integration.

$$\int_0^8 \int_{\sqrt[3]{y}}^2 e^{x^4} dx dy$$

2. [25 points] Use a double integral and symmetry to find the area of the region bounded between the cardioids

$$\begin{cases} r(\theta) = 1 + \cos\theta, & \text{and} \\ r(\theta) = 1 - \cos\theta. \end{cases}$$



3. [30 points] A solid lies above the cone

$$z = \sqrt{x^2 + y^2}$$

and below the sphere

$$x^2 + y^2 + z^2 = z.$$

Use spherical coordinates to compute the volume of this solid.

4. [30 points] Use a change-of-coordinates transformation to compute the integral

$$\iint_R \sin(9x^2 + 4y^2) \, dA$$

where  $R$  is the region in the first quadrant bounded by the ellipse  $9x^2 + 4y^2 = 1$ .

scratch page