

Homework IV First-Half

Due in class August 01 2017

0. Read The Following Sections:

Chapter 12 Multiple Integrals: Section 12.1 Double Integrals Over Rectangles, 12.2 Double Integrals Over General Regions, 12.3 Double Integrals In polar Coordinates

1. Calculate the following integrals:

(a). $\int_1^4 \int_0^2 6x^2y - 2x \, dy \, dx$

(b). $\int_1^3 \int_1^5 \frac{\ln y}{xy} \, dy \, dx$

2. Calculate the double integral:

$$\iint_R x \sin(x + y) \, dA$$

where $R = [0, \frac{\pi}{5}] \times [0, \frac{\pi}{3}]$

3. Calculate the double integral:

$$\iint_R ye^{-xy} \, dA$$

where $R = [0, 2] \times [0, 3]$

4. Find the volume of the solid that lies under the plane $4x + 6y - 2z + 15 = 0$ and above the rectangle $R = [-1, 2] \times [1, 2]$

5. Evaluate the following integrals:

(a). $\int_0^4 \int_0^{\sqrt{y}} xy^2 \, dx \, dy$

(b). $\int_0^1 \int_0^{e^v} \sqrt{1 + e^v} \, dw \, dv$

6. Evaluating the double integrals:

(a). $\iint_D y^2 dA$, where $D = \{(x, y) \in \mathbb{R}^2 \mid -1 \leq y \leq 1, -y - 2 \leq x \leq y\}$

(b). $\iint_D x^3 dA$, where $D = \{(x, y) \in \mathbb{R}^2 \mid 0 \leq y \leq \ln x, 1 \leq x \leq e\}$

7. Reversing the order of the integration:

(a). $\int_0^{\sqrt{\pi}} \int_y^{\sqrt{\pi}} f(x, y) dx dy$

(b). $\int_0^4 \int_{\sqrt{x}}^2 f(x, y) dy dx$

8. Evaluate the given integral by changing to polar coordinates:

$$\iint_D x^2 y dA$$

where D is the top half of the disk with center the origin and radius 5

9. Sketch the region whose area is given by the integral and evaluate the integral:

$$\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \int_1^2 r dr d\theta$$

10. Evaluating the integral by converting to polar coordinates:

$$\int_{-3}^3 \int_0^{\sqrt{9-x^2}} \sin(x^2 + y^2) dy dx$$