

Calculus II

Assignment 8

20180710

Name : _____

Student ID : _____

1. Evaluate the integral $\iiint_E (xy + z^2) dV$, where $E = \{(x, y, z) | 0 \leq x \leq 2, 0 \leq y \leq 1, 0 \leq z \leq 3\}$ using different orders of integration as (1) $dzdydx$ and (2) $dx dy dz$.
2. Evaluate the iterated integral.
$$\int_0^2 \int_0^{z^2} \int_0^{y-z} (2x - y) dx dy dz$$
3. Evaluate the triple integral.
$$\iiint_E e^{z/y} dV, \text{ where } E = \{(x, y, z) | 0 \leq y \leq 1, y \leq x \leq 1, 0 \leq z \leq xy\}$$
4. Change from rectangular to cylindrical coordinates.
 $(-1, 1, 1)$
Hint : $x = r \cos \theta, y = r \sin \theta, z = z$
5. Evaluate the integral by changing to cylindrical coordinates.
$$\int_{-2}^2 \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} \int_{\sqrt{x^2+y^2}}^2 xz dz dx dy$$
6. Find the Jacobian of the transformation.
 $x = 5u - v, y = u + 3v$
7. Evaluate the integral by making an appropriate change of variables.
$$\iint_R (x + y) e^{x^2 - y^2} dA, \text{ where } R \text{ is the rectangle enclosed by the lines } x - y = 0, x - y = 2, x + y = 0, \text{ and } x + y = 3.$$
8. *Change from rectangular to spherical coordinates.
 $(-1, 1, -\sqrt{2})$
Hint : $x = \rho \sin \phi \cos \theta, y = \rho \sin \phi \sin \theta, z = \rho \cos \phi, \rho^2 = x^2 + y^2 + z^2$
9. *Evaluate the integral by changing to spherical coordinates.
$$\int_{-a}^a \int_{-\sqrt{a^2-y^2}}^{\sqrt{a^2-y^2}} \int_{-\sqrt{a^2-x^2-y^2}}^{\sqrt{a^2-x^2-y^2}} (x^2 z + y^2 z + z^3) dz dx dy$$

Notice : * are optional questions.

Reading materials : Textbook (Calculus 6ed Stewart) Section 16.6~16.9, especially

- Section 16.6 Example 1, 2, 3.
- Section 16.7 Example 1, 3, 4.
- Section 16.8, Example 1, 2, 3.
- Section 16.9, Example 1, 2, 3.

Or alternative Textbook (Calculus Early Transcendentals 6ed Stewart) Section 15.6~15.9 and the corresponding examples.