Calculus II

Assignment 8

20180710

Name : _____

Student ID : _____

1. Evaluate the integral $\iiint_E (xy + z^2)dV$, where
   $E = \{(x, y, z)|0 \le x \le 2,\ 0 \le y \le 1,\ 0 \le z \le 3\}$
   using different orders of integration as (1)$dzdydx$ and (2)$dxdydz$.
2. Evaluate the iterated integral.
   $\int_0^2 \int_0^{z^2} \int_0^{y-z} (2x - y)dxdydz$
3. Evaluate the triple integral.
   $\iiint_E e^{z/y}dV$, where $E = \{(x, y, z)|0 \le y \le 1,\ y \le x \le 1,\ 0 \le z \le xy\}$
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.
   $\int_{-2}^2 \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} \int_{\sqrt{x^2+y^2}}^2 xzdzdxdy$
6. Find the Jacobian of the transformation.
   $x = 5u - v,\ y = u + 3v$
7. Evaluate the integral by making an appropriate change of variables.
   $\iint_R (x + y)e^{x^2-y^2}dA$, where R is the rectangle enclosed by the lines
   $x - y = 0, x - y = 2, x + y = 0$, 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.
   $\int_{-a}^a \int_{-\sqrt{a^2-y^2}}^{\sqrt{a^2-y^2}} \int_{-\sqrt{a^2-x^2-y^2}}^{\sqrt{a^2-x^2-y^2}} (x^2z + y^2z + z^3)dzdxdy$

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 alternate Textbook (Calculus Early Transcendentals 6ed Stewart) Section 15.6∼15.9 and the corresponding examples.