Assignment 10

Due Date:2pm 15/May/2023(Mon). [Please pay attention to the deadline]

- Write down your **Chinese name** and **student number**. Write neatly on **A4-sized** paper and **show your steps**.

- **Late submissions or answers without details will not be graded.**

1. Evaluate the iterated integrals

   (a)
   $$\int_1^5 \int_1^6 \frac{\ln y}{xy} dxdy$$

   (b)
   $$\int_0^1 \int_0^2 ye^{x-y} dxdy$$

   (c)
   $$\int_0^3 \int_0^{\pi/2} t^2 \sin^3 \phi d\phi dt$$

2. Evaluate the double integrals as the volume of a solid over region R

   (a)
   $$\iint_R \sqrt{2} dA, \qquad R = \{(x,y) \,|\, 2 \le x \le 6, -1 \le y \le 5\}$$

   (b)
   $$\iint_R \left(1 - x^2 y\right) dA, \qquad R = \{(x,y) \,|\, 0 \le x \le 1, 1 \le y \le 2\}$$

3. Find the volume of the solid enclosed by the surface $z = 1 + x^2 y e^y$ and the planes $z = 0$, $x = \pm 1$ and $y = 0$ and $y = 1$.

4. Evaluate the iterated integrals

   (a)
   $$\int_0^2 \int_0^{y^2} x^2 y dxdy$$

5. Evaluate the integrals by reversing the order of integration

   (a)
   $$\int_0^1 \int_{3y}^3 e^{x^2} dxdy$$

   (b)
   $$\int_0^1 \int_{\sqrt{x}}^1 \sqrt{y^3 + 1} dydx$$

(c)

$$\int_0^1 \int_{\arcsin y}^{\pi/2} \cos x \sqrt{1 + \cos^2 x} \, dx dy$$

6. Evaluate $\iint_D e^{-x^2 - y^2} dx dy$, where D is the region bounded by the semicircle $x = \sqrt{4 - y^2}$ and y-axis.

7. Use polar coordinates to find the volume of the given solid under the paraboloid $z = x^2 + y^2$ and above the disk $x^2 + y^2 \le 25$.

8. Evaluate the iterated integral by **converting to polar coordinates**

(a)

$$\int_0^a \int_{-\sqrt{a^2 - y^2}}^{\sqrt{a^2 - y^2}} (2x + y) \, dx dy$$

(b)

$$\int_0^1 \int_{\sqrt{3}y}^{\sqrt{1 - y^2}} xy^2 dx dy$$