

Total score: 36 points

March Boedihardjo © 2021

- Write your solutions on some papers. Show all your work. Scan as a pdf/jpg file(s). Upload the pdf/jpg file(s) as CCLE Assignment Midterm 1 before the end time.
 - Open book. You may use calculator. But you cannot get any help from other people.
 - You may compute any integral using Fundamental Theorem of Calculus without using the definition involving Riemann sum.
 - If your final answer is a number, have it in 6 decimal places.
1. (8 points) (i) Find the polar coordinates of the Cartesian coordinates $(2, -5)$
(ii) Find $S_{2,3}$ for $\int_{[0,3] \times [0,1]} \frac{x+1}{y+1} d(x,y)$ using lower-left vertices.
(iii) Write the curve $r = 1 + 3 \cos \theta$ in terms of x, y .
(iv) Find $\int_{[0,1] \times [0,2]} (x^2 + y)^2 d(x,y)$.
 2. (8 points) Let $D = \{(x,y) | y^2 + 1 \leq x \leq 3\}$. Find $\int_D x d(x,y)$ using
 - (i) $\int \int dx dy$ set up.
 - (ii) $\int \int dy dx$ set up. (Use substitution rule if needed.)
 3. (8 points) Let $D = \{(x,y) | y > 0, x^2 + y^2 \leq 3\}$. Find $\int_D y d(x,y)$ using
 - (i) $\int \int dr d\theta$ set up.
 - (ii) $\int \int dx dy$ set up. (Use substitution rule if needed.)
 4. (12 points) Use $\int \int \int dz dx dy$ set up to find $\int_W 1 d(x,y,z)$ where
 - (i) $W = \{(x,y,z) | 0 \leq x \leq 2, 0 \leq y \leq 2, x + y \leq z \leq 3\}$.
 - (ii) $W = \{(x,y,z) | 0 \leq x \leq 1, 0 \leq y \leq 2, x \leq z \leq y\}$.

Each part is 6 points. For 4(ii), if you choose to set up using $\int \int \int dz dy dx$, please indicate so but you will get at most 4 points for 4(ii).

End of exam