

HW 6
Math 261, S19

Please see the course syllabus for details on how to turn in your homework assignments. This one is due at the beginning of your class on **Friday, March 29**.

1. (5 pts.) TRUE OR FALSE:
 - (a) Let R denote a region in the xy -plane. The expression $\int_R dx dy$ computes the area of R .
 - (b) Let R denote a region in the xy -plane, and $f(x, y)$ a function from \mathbb{R}^2 to \mathbb{R} . The expression $\int_R f(x, y) dx dy$ is always positive.
 - (c) Let R denote a region in the xy -plane, and $f(x, y)$ a function from \mathbb{R}^2 to \mathbb{R} such that $f(x, y)$ is non-negative for any point in R . The expression $\int_R f(x, y) dx dy$ computes the volume under the graph of f (and bounded below by the xy -plane).
 - (d) $\int_2^4 \int_3^7 dx dy = \int_3^7 \int_2^4 dy dx$.
 - (e) $\int_2^4 \int_3^7 f(x, y) dx dy = \int_3^7 \int_2^4 f(x, y) dy dx$ for any function $f(x, y)$.
2. (3 pts.) Suppose we wish to integrate $f(x, y) = 3x^2 - xy + 3$ over the rectangle given by $0 \leq x \leq 2$, $1 \leq y \leq 5$. Set up this integral using the variable order $dx dy$ but do not compute the answer.
3. (3 pts.) Now compute the answer to the previous problem.
4. (3 pts.) Repeat problem 2 using variable order $dy dx$ and compute the answer.
5. (3 pts.) Suppose we wish to integrate some function $g(x, y)$ over the triangle with vertices $(0, 0)$, $(0, 2)$, and $(1, 2)$. Set up this integral using the variable order $dx dy$. (Do not compute the answer.)
6. (3 pts.) Compute the volume of the octahedron in \mathbb{R}^3 with vertices at $(0, 0, \pm 1)$, $(0, \pm 1, 0)$, $(\pm 1, 0, 0)$. (Hint: exploit the symmetries of the problem to reduce to a problem that may be computed as a simple double integral).