HW 6
Math 261, F19

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, October 25**.

1. (5 pts.) TRUE OR FALSE:
   (a) Let R denote a region in the xy-plane. The expression $\int_R dxdy$ 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 $\int_R f(x, y)dxdy$ 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 $\int_R f(x, y)dxdy$ computes the volume under the graph of f (and bounded below by the xy-plane).
   (d) $\int_2^4 \int_3^7 dxdy = \int_3^7 \int_2^4 dydx$.
   (e) $\int_2^4 \int_3^7 f(x, y)dxdy = \int_3^7 \int_2^4 f(x, y)dydx$ 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 $dxdy$ 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 $dydx$ 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 $dxdy$. (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).