HW 7
Math 261, S18

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 30**.

1. Set up but do **NOT** evaluate a double integral to compute the integral of \( f(x, y) = \cos(xy) \) over the part of the unit disk (the region inside the circle of radius 1 centered at the origin) in the first quadrant (where \( x > 0, y > 0 \)). **USE** the variable order \( dx \ dy \).

2. Convert the following double integral to an equivalent **polar** form but do **NOT** evaluate:

\[
\int_{0}^{1} \int_{y}^{\sqrt{4-y^2}} x^2 + y^2 \, dx \, dy
\]

3. Set up but do **NOT** evaluate a triple integral to compute the volume of the tetrahedron with vertices \((0, 0, 0), (1, 0, 0), (0, 2, 0),\) and \((0, 0, 1)\). The top plane of the tetrahedron is given by \(2x + y + 2z = 2\). **USE** the order \( dz \ dy \ dx \).

4. Consider the tetrahedron \( T \) with vertices \((1, 0, 0), (1, -1, 1), (1, 1, 1), \) and \((0, 0, 1)\). How many regions must \( T \) be split into in order to integrate some function over \( T \) with the following variable orders (each worth 1 point)? (Each answer is just 1 number!)

(a) \( dx \ dy \ dz \)
(b) \( dx \ dz \ dy \)
(c) \( dy \ dz \ dx \)

(It would be good practice to try setting these integrals up, but that’s not required for the problem.)