HW 8
Math 261, F18

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, November 2.

1. Using cylindrical coordinates, set up the integral to find the volume of the region enclosed by the vertical cylinder $x^2 + y^2 = 4$ and the planes $z = 0$ and $y + z = 4$. Do NOT evaluate the integral; just set it up.

2. Using spherical coordinates, set up the integral to find the volume of the region enclosed by the vertical cylinder $x^2 + y^2 = 4$ and the planes $z = 0$ and $z = 2$. Do NOT evaluate the integral; just set it up.

3. Consider using the substitution \[
\begin{align*}
x &= u - v, \\
y &= 2u + v
\end{align*}
\] for the integral of $x + y^2 - 2$. What is the integrand in terms of $u$ and $v$? (Don’t bother with the integral signs, the bounds, or the $du \ dv$.)

4. Using the same substitution as in the previous problem, suppose the $(x, y)$ region over which we wish to integrate includes the boundary line $2x - y = 3$. Convert this line into a $(u, v)$ boundary line.