Math2204: Written HW6 (Due Friday 3/21, 5pm)

No calculator or other electronic devices for written HWs.

Hand in **ALL WORK AND REASONING** for the following problems.

NOTE: Set ups of triple integrals need a sketch of E and D.

Set ups of double integrals need a sketch of D.

Choose the easiest setup if you have a choice.

- **Section 15.1**: 35, 48 (setup a double integral only).
- **Section 15.2**: 39 (setup a double integral only), 48.
- **Section 15.3**: 32 (setup in polar coordinates only).
- **Section 15.4**: 18 (setup only; include the formulas you used).
- **Section 15.6**: 31, 32, 39 (setup $\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z$ only), 51ab (include the formulas you used).

A) Let D be a thin plate in $\mathbb{R}^2$ bounded by $y = x^2 - 1$ and $y = x + 1$. The density is $\delta(x, y) = 1 + x^2$.

(1) Write the formulas for the mass and x-coordinate of the center of mass of E.

(2) Set up a double integral for the mass of the lamina in both $\mathrm{d}x\,\mathrm{d}y$ AND $\mathrm{d}y\,\mathrm{d}x$ order.

(3) Set up a double integral for the x-coordinate of the center of mass of the lamina.

B) Set up a triple integral in $\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z$ order for $\iiint_E z\,\mathrm{d}V$ where E is the tetrahedron with vertices $(2, 0, 0)$, $(2, 3, 0)$, $(0, 3, 0)$, and $(2, 3, 6)$.

C) Set up a triple integral for $\iiint_E y\,\mathrm{d}V$ where E is the pyramid with vertices $(0, 0, 0)$, $(2, 0, 0)$, $(2, 3, 0)$, $(0, 4, 0)$, and $(0, 0, 4)$. Choose an easy order for the setup AND briefly explain why your choice is the easiest order.

D) Set up a triple integral for $\iiint_E x\,\mathrm{d}V$ where E is the region in the first octant enclosed by $x = y$, $x + y = 2$, $y = 0$, $z = 0$, and $z = 2 + y$. Choose an easy order for the setup AND briefly explain why your choice is the easiest order.

E) Set up a triple integral for the volume of the solid E that is enclosed by $x = 4y^2 + z^2$ and $x = 8 - 4y^2 - z^2$. Include the formula for the volume of E.