HW 10
Math 261, F17

This is the last homework set of the semester! This one is due at the beginning of your class on **Wednesday, December 6**.

1. Set up AND EVALUATE the integral(s) to compute the outward flux of the vector field $\mathbf{F} = \langle xy, y^2 \rangle$ for the region enclosed by the curves $y = x^2$ and $y = x$ in the first quadrant, without parameterizing the curves.
2. Use Green's Theorem (either version) to set up AND EVALUATE $\int_C y^2 dx + x^2 dy$ where C is the triangle bounded by $x = 0$, $x + y = 1$, and $y = 0$ (with counterclockwise orientation).
3. Parameterize the portion of the plane $2x - 3y + z = 5$ over the square $0 \leq x \leq 1$, $2 \leq y \leq 5$. In particular, please provide $\mathbf{r}(x, y)$ in the parameters x and y.
4. Suppose some surface S is parameterized by $\mathbf{r}(u, v) = (u^2, uv, v^2)$, for $-1 \leq u \leq 1$, $0 \leq v \leq 2$. Set up but DO NOT EVALUATE an integral to find the surface area of S.
5. Let $\mathbf{F} = \langle 3x^2, -2xy, -3xz \rangle$ and let D be the solid cut from the first octant by the plane $x+2y+z = 2$. Write down an integral to find the outward flux of $\mathbf{F}$ across the boundary of D using the Divergence Theorem, i.e., set up (BUT DO NOT EVALUATE) the triple integral in the Divergence Theorem. Use the variable order $dz\ dy\ dx$.