HOMEWORK 4 MATH-GA 2350.001 DIFFERENTIAL GEOMETRY I

(due by October, 24, 2016)

1. Show that on $\mathbb{R}^2$ the vector fields $y^2\frac{\partial}{\partial x}$ and $x^2\frac{\partial}{\partial y}$ are complete, but the vector field $y^2\frac{\partial}{\partial x} + x^2\frac{\partial}{\partial y}$ is not complete.

2. Let $a \in \mathbb{R}^n$. Let X_a be the vector field defined by $X_a(y) = a - y$.
   (a) Compute the flow of X_a;
   (b) If $b \in X_b$, compute $[X_a, X_b]$ using the flows of X_a and X_b.

3. Find global noncommuting flows on S^2.