ENEE 661 Spring 2011 Homework 2
due 02/22/2011

1. Complete exercise on composition formula

$$\Phi_g^{-\varepsilon}\left(\Phi_f^{-\varepsilon}\left(\Phi_g^{\varepsilon}\left(\Phi_f^{\varepsilon}(x_0)\right)\right)\right)$$

$$= x_0 + \varepsilon^2[f,g](x_0) + O(\varepsilon^3)$$

for vector fields $f, g$ on $\mathbb{R}^n$ using the hint given in page 14 of Lecture Notes 2(b) and the discussion of fundamental theorem of calculus in pages 11 - 14 of the same set of notes.

2. Verify the bracket relations for the kinematic car in pages 16-18 of the Lecture Notes 2(b), for general $\theta$ and for $\theta = 0$.
Write the kinematic car as a differential equation with speed and steering controls.
Write a MATLAB simulation and implement / explore the parking algorithm.

3. Do exercise (3.1) in H. Khalil (Nonlinear Systems)
4. Do exercises (3.2) and (3.3) " "