Problem Set 1 Math 637 Winter 2012

You may use any theorems proved in class, or proved in the textbook [Kir] before the corresponding exercise.

(1) Let G be a Lie group, and H a subgroup. Prove that if H is an imbedded submanifold of G, then H is closed in G.

(2) Let G be a Lie group. Prove that the smoothness of the inverse map $g \mapsto g^{-1}$ follows from the smoothness of the multiplication map $m : G \times G \to G$. (Hint: look up and use the implicit function theorem.)

(3) Show that a connected Lie group is generated by every neighborhood of the identity.

(4) [Kir, Problem 2.2]

(5) [Kir, Problem 2.4]

(6) [Kir, Problem 2.15]

(7) [Kir, Problem 2.16] Part (c) is optional. (You may want to google "long exact sequence for homotopy groups")