Assignment 10
due on Wednesday, June 20, 2018

Name:

Exercise 1 (15 points)**.**
Choose some N and give a representation V of GL_N and a vector $v \in V$ such that the orbit span $\langle \mathsf{GL}_N v \rangle$ is not irreducible.

Exercise 2 (15 points)**.**
Let $i \in \mathbb{C}$ denote the imaginary unit, i.e., $i^2 = -1$. Let $C := \{e^{\alpha i} \mid 0 \leq \alpha < 2\pi\} \subseteq \mathbb{C}$ denote the circle group. Prove that for every C-representation V there exists a C-invariant inner product.

Exercise 3 (10 points)**.**
If $H \leq G$ is a subgroup, then every G-representation is also an H-representation in the natural way. Construct an example of a group G, an irreducible G-representation V, and a subgroup $H \leq G$ such that V is not irreducible as an H-representation.