CIS Homework 2

1. Specify fitness functions that could be used in evolving agents that:

   (a) Control an elevator

   (b) Control stop lights on a city street.

   (20 points)

2. The crossover operation used in GP selects a random subtree in both parents. Comment on what you think the effects would be of biasing the random selection according to:

   (a) Preferring those subtrees that were highly active during the fitness trials.

   (b) Preferring large subtrees to small subtrees.

   (c) Preferring small subtrees to large subtrees.

   (30 points)

3. An elevator can sense the following information about its environment:

   - What floor the elevator is stopped at.
   - What floors the passengers in the elevator want to go to.
   - What floors passengers outside the elevator want rides from, and whether they want to go up or down.
   - Whether the elevator do is open or closed.

   The elevator is capable of performing the following actions:

   - Go up exactly one floor (unless it is already at the top).
   - Go down exactly one floor (unless it is already at the bottom.
   - Open the elevator door.
   - Close the elevator door.
   - Wait Δ seconds (a fixed time for people to get in and out of the elevator).

Design a production system to control the elevator in an efficient manner (It is not efficient, for example, to reverse the elevator direction from going up to going down either if there is someone in the elevator who wants to go to a higher floor or if there is someone on a higher floor who wants to get in).
(50 points)