LING3701/PSYCH3371: Problem Set 1

Due via Carmen dropbox at 11:59 PM 5/26.

1. Assume a probability space, as described in the lecture notes, over a seed you are planting, with outcomes:

   - T that the plant turns out to be a tree
   - S that the plant turns out to be a shrub
   - G that the plant turns out to be green
   - B that the plant turns out to be brown

   Using the above outcomes ...

   (a) [3 pts.] Write a probability equation expressing that half the time your seed will turn out to be a tree.

   (b) [3 pts.] Write a probability equation expressing that half the time your seed will turn out to be a green tree.

   (c) [3 pts.] Write a probability equation expressing that if your seed turns out to be a tree, half the time it will be green.

2. Suppose you have the following probability model over a seed you are planting:

   - a third of the time you get a green tree
   - a sixth of the time you get a brown tree
   - a third of the time you get a green shrub
   - a sixth of the time you get a brown shrub

   Using the above model ...

   (a) [3 pts.] What is the probability it will turn out to be a green plant (either a tree or a shrub)?

   (b) [3 pts.] If you already know it will turn out to be green, what is the probability it will turn out to be a tree?

3. Using the generalized quantifier functions in the lecture notes on lambda calculus and the following predicates:

   - Tree x, meaning that x is a tree
   - Green x, meaning that x is green
   - Round x, meaning that x is round
   - Park x, meaning that x is a park area
   - In x y, meaning that x is in area y

   (a) [3 pts.] Write a lambda calculus expression stating that half the green trees are round.

   (b) [3 pts.] Write a lambda calculus expression stating that half the trees are green and round.

   (c) [3 pts. – tricky!] Write a lambda calculus expression stating that all the trees are in some (possibly different) park.