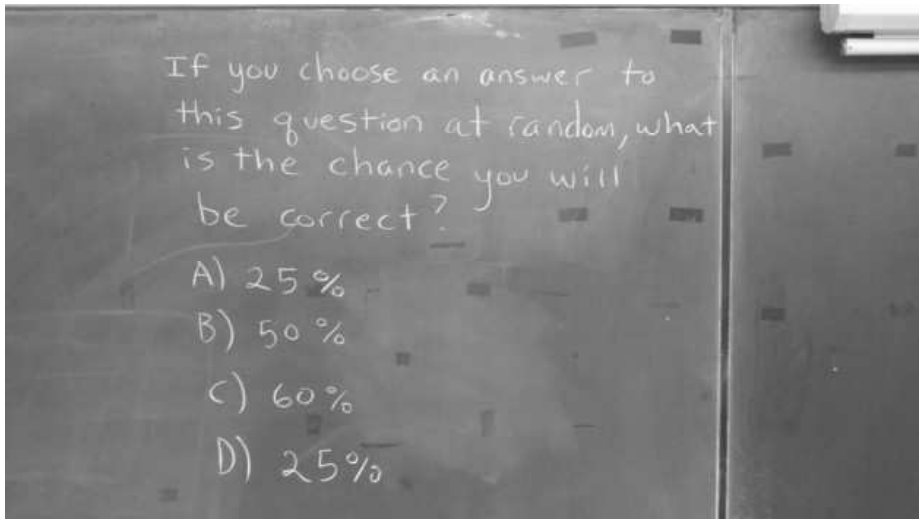
Mathematics 1550H – Introduction to probability
TRENT UNIVERSITY, Summer 2014

Solutions to Assignment #1
Puzzle Pair

1. The following appeared online some years ago. [Its origins are unknown to your instructor.]



Explain, as completely (and correctly!) as you can just what is going on in the problem posed in this image. *[5]*

SOLUTION. Sadly, there is no correct answer. A random choice of four different answers, one of which is correct, has a 25% chance (*i.e.* a probability of $\frac{1}{4} = 0.25$) of being correct. In this case, however, two of the four alternatives are the same, namely 25%, so the possible answer of 25% would have a 50% chance (*i.e.* a probability of $\frac{1}{2} - 0.5$) of being chosen. To add insult to injury, the possible answer of 50% occurs once, so it would be randomly chosen 25% of the time (*i.e.* with a probability of $\frac{1}{4} = 0.25$).

Essentially, the problem has been set up to be internally contradictory. What makes this possible is the fact that the problem is self-referential: the opening phrase "If you choose an answer to this question at random" makes the question talk about itself, and then the evil selection of possible answers makes it impossible to find a correct answer. ■

The following question has nothing to do with the one above, though they do have a key feature in how they work in common. *[That is, both are self-referential.]*

2. How many letters are in the answer to this question? *[5]*

SOLUTION. The question demands a number as an answer, and a number equal to the number of letters in that number. There are two possible answers known to your instructor, both of which he got where he found the problem at: `ken.duisenberg.com/potw/archive/arch98/980608.html`

First, there is the answer "four," which word has four letters.

Second, there is the answer "0," which meets the requirement because it is a single digit, which doesn't count as a letter, so it has no letters.

It doesn't seem likely that there are any others, at least in English with the usual conventions, but maybe that just means we're not sufficiently ingenious. ■