Assignment for Module 1

1. Problem 2.3 in the textbook [30 points]

2.3. Use Bayes' rule to solve the following problem. One third of the time, Milo takes the bus to work and the other times he takes the train. The bus is less reliable, so he gets to work on time only 50% of the time. If taking the train, he is on time 90% of the time. Given that he was on time on a particular day, what is the probability that Milo took the bus?

2. Problem 2.4 in the textbook [30 points]

2.4. In a game based on a deck of 52 cards, a single card is drawn. Depending on the type of card, a certain value is either won or lost. If the card is one of the four aces, $10 is won. If the card is one of the four kings, $5 is won. If the card is one of the eleven diamonds that is not a king or ace, $2 is won. Otherwise, $1 is lost. What are the expected winnings or losings after drawing a single card? (Would you play?)

3. Problem 2.7 in the textbook [40 points]

2.7. In the information theory section, we compared the entropy of the word *the* to that of the word *unicorn*. In general, what types of words have a high entropy and what types of words have a low entropy? As an example, consider a corpus of ten documents where *the* occurs in all documents, *unicorn* appears in five documents, and *Mercury* appears in one document. What would be the entropy value of each?