

Due: Wednesday, September 30, 2:30 PM EST

This assignment is worth 12.5% of the final grade. Each question is worth a multiple of 5 points. If you have no idea how to answer a question, you will receive 20% of the credit for that question by saying “I do not know how to answer this question”. Leaving the question blank, you will receive 10% of the credit. If your answer makes no sense, you will not receive any credit. Any answer that shows some understanding of the question will receive more 20% credit.

1. (5 points)

Provide a ranked list of five topics you are most interested in. Explain briefly your choice.

2. (10 points)

Given that different individuals have different preferences, to decide what topics to present requires forming a consensus ranking. Forming consensus and making “fair” decisions are central topics in computational social choice. Briefly describe how you would form a consensus to choose a ranked list of 5 topics and then justify (in your own words) why you think your method is “fair”, whatever you think fair means.

3. (10 points) Voting in our Canadian political elections (e.g. for a mayor, an MPP, an MP) is forming a consensus to choose a single winner amongst many possible candidates. We do this by plurality voting; that is, electing the person receiving the most votes. Briefly say what are the advantages and what are the disadvantages for this method.

4. (5 points) Give your opinion as to why von Neumann is said to have favoured a fixed point representation.

5. This exercise relates to the even more simplified floating point representation that was illustrated in slide 3 of the Lecture slides for our fourth class. Here, a floating point number $s\#e_{k-1}\dots e_0\#b_{\ell-1}\dots b_0$ represents the decimal number $x = (-1)^s \cdot 2^{E'} \cdot \sum_{i=1}^{\ell} b_{i-1}2^{-i}$ where $E' = (-1)^{e_{k-1}} \cdot E$ and $E = \sum_{j=1}^{k-1} e_{j-1}2^{j-1}$.

- (5 points) In binary and decimal, what is the largest positive number you can represent using this simplified floating point representation?
- (5 points) What decimal number does the 8 bit floating point number 01110011 represent?