CSCE 3210 Symbolic Processing - EXAM 1

Choose 3 out of the following 5 questions, for 10 points each.

Q1. Write a Prolog program that solves the crypt-arithmetic puzzle:

    EAT +
    THAT
    ------
    APPLE

Q2. A prolog database contains all the English words in a dictionary as lists of
    unicode (or ASCII) codes, e.g. the facts in the predicates look like this:

        ...include facts...
    \dict("abracadabra").
    ...include facts...
    \dict("printer").
    ...include facts...
    \dict("zebra").
    ...

Use this dictionary to find all the anagrams (words in the dictionary containing
    exactly the same letters) of a query word, i.e. something like

    ?- anagram_of(reprint,Anagram).

would return as (one of the) answers

    Anagram=printer.

Note that we do not assume that the query word is itself in the dictionary.
Hint: use atom_codes to convert between list of codes and Prolog symbols.

Q3. Discuss the advantages and the disadvantages of the following algorithms:

    a. Depth First Search
    b. Breadth First Search
    c. Breadth First Search with Iterative Deepening
    d. A*-search

Q4. A social network has one-way "like/follow" links expressing appreciation between members.
    These links are contained in a Prolog data-base of facts of the form "likes(Person,OtherPerson)".

    a. Write a predicate that finds all the members A,B such that A likes
       B but B does not like A or B likes A but A does not like B. Collect
       all your answers to a list of lists of 2 elements, without duplications.

    b. Find the member with the largest number of "followers", i.e. the member
       who has the largest number of incoming "like" links.

    c. Find all the members that nobody likes.

Q5. A social network contains "friend" links that are always symmetric i.e. A is a friend of B
    if and only if B is a friend of A.

    Write an iterative deepening-based search program in Prolog, that lists the friends of a person,
    then the friends of the friends of a person etc., i.e. your program must ensure that closer friends
    are found first.