

CS 140: Intro to Computer Science, Fall 2011

Homework 10

Due (in class or via email) by 1pm on Monday, Dec. 12, 2011

1. Why are trees for complex games like chess too large for practical computation? What strategies are used to compensate for this?
2. Suppose we have an element in an artificial neural net.
 - (a) If the processing element accepts 5 input signals with values 1,0,1,0, and 1, and the corresponding weights are -2, 2, 3, 6, and 1, what is the output if the threshold is 5?
 - (b) If the processing element accepts 5 input signals with values 1,0,1,1, and 0, and the corresponding weights are -2, 2, 3, 6, and 5, what is the output if the threshold is 5?
3.
 - (a) Show how the numbers 5492 and 4329 would be represented in a linked list with one digit per node.
 - (b) Use the linked list representation to represent the sum of these numbers.
 - (c) Describe an algorithm to show how this calculation might be carried out by a computer.
4. Given the following numbers, what would the check digit be?
 - (a) 4926
 - (b) 2481
 - (c) 2964
5. What types of errors would be detectible using the check bits in the previous problem?
6. What is polynomial time, and why are algorithms that run in polynomial time more desirable?
7. What is a relational database? How are relationships represented in such a database?
8. Draw a simple ER diagram and small sample tables that model a database which stores data about books in a library, the students who use the library, and the ability to check books out for a period of time.
9. Using a Caesar cipher, shifting three letters to the right, encrypt the message "CS IS THE BEST".
10. What is the difference between public key and private key cryptography?