



## CYBER AND ARTIFICIAL INTELLIGENCE

### SAMPLE QUESTIONS

1. A while back, the IT folks got a number of complaints that one of our campus computers was sending out Viagra spam. They checked it out, and the reports were true: a hacker had installed a program on the computer that made it automatically send out tons of spam email without the computer owner's knowledge.

Q: How do you think the hacker got into the computer to set this up?

2. After reading a newspaper 'scare story' about password security, Walter has decided to implement strict rules regarding the passwords used by the staff in his company. Walter insists that:

Staff passwords are of length 15 characters or more.

Staffs change their passwords at least once a week.

Every password contains a mix of letters and digits.

a) Explain why Walter's password policy is likely to make the password system at his company less rather than more secure.

b) Write a more suitable password policy explaining the importance of each rule you suggest.

c) Assuming that a password cracking program can check 10,000 passwords per minute, calculate the average amount of time that it would take to find a password based on the policy that you have written in **part B**.

3. a) The following are seven features that may be provided by a security system. For each write a sentence describing what is meant by the feature:

- i. Confidentiality
- ii. Integrity
- iii. Availability
- iv. Non-repudiation
- v. Authentication
- vi. Access control
- vii. Accountability.

b) A University department has a file called *exam marks* which contains a list of examination marks indexed by student names in alphabetical order. A student manages to access the exam marks file. The student cannot read the file since it is encrypted. However they can work out the position of their own mark making use of the fact that the students are listed in alphabetical order. The student swaps their mark with that of the student who is always 'top of the class'. Discuss which of the security features listed in **part A** have been breached.

4a. (i) Briefly describe the Turing Test for intelligence.

(ii) What does the Turing test say about the nature of intelligence?

(iii) Can you formulate a better test for intelligence?

(b) It is not possible to enter into a moral contract with non-human animals; therefore society cannot assign legal rights to non-human animals. The legal world has recognized this issue and many discussions have been held how to protect not only non-human animals, but also land and associated vegetation, etc. Should the scientific community be concerned with animating human intelligence through AI? Do we have moral obligations towards machines?

5. You got a summer job at a sandwich shop downtown. The shop sells different kinds of sandwiches, each consisting of a type of bread, a type of meat (or substitute), a type of cheese (if the customer wants some) and a type of vegetable. Each day, you have to go to the grocery store and buy supplies for the day's sandwiches. Bread has to be discarded at the end of the day. Meat and cheese have to be discarded after a week. Vegetables are discarded after 3 days. You know that customers come in randomly. If a customer cannot have the desired sandwich, she will leave and there is a 0.5 probability that she will never come to the shop again. Of course, customers pay different amounts for different sandwiches, and you have to pay for the groceries. Having taken AI, you want to optimize, in a principled way, the amount of purchases you are making. Describe this problem using any AI technique of your choice. Explain all the components of your model. What algorithms could you use to solve this problem?