7 questions of equal weight.

Attempt any four of the questions.

1) **Authentication**:
Describe some of the attacks against password systems, and appropriate countermeasures against those attacks. Furthermore describe the role of multiple factor authentication, and of multiple channel authentication.

2) **Unified Threat Management**:
Explain the relationships between logging, auditing, intrusion detection, intrusion prevention and firewalls in the context of identifying and handling attacks. Be sure to explain the different purposes each of those components plays.

3) **Denial of service (DOS)**:
Explain what denial of service and distributed denial of service are. Give an example of what DOS is likely to attack and how an attack against that target might be realised. For each of the following two mechanisms, sketch the idea behind them, explain how they provide protection against DOS, and describe one potential problem.
    (a) CAPTCHA.
    (b) Client puzzles.

4) **Secure code**:
Explain four guiding principles in the development of secure code. Give examples of how one might follow such principles, and examples of the potential results of not following such principles.

5) **Malware**:
Describe the fundamental characteristic of malware. Explain how various different types of malware are classified by target, method of concealment and means of propagation. Give specific examples. Describe two mechanisms or techniques used to provide protection against malware, either specific malware or general malware.

6) **Access control**:
Explain the purpose of access control and describe the primitive components used to describe it. Describe the basic access control structures we have considered. Explain carefully the relationships between such structures. Be sure to explain clearly the different types of grouping possible.
NOTE: This question is not primarily about BLP and/or Biba, it is more general.

7) **Inference**:
Explain what inference and aggregated data are, and how they are related. Illustrate your explanation with an example. Describe the context. Describe two mechanisms that can be used to protect against inference.

End of Examination