1) (20 pts) a. Explain the principal procedural differences between the Waterfall, Spiral and AGILE models of software development. **b.** Explain in a few sentences why the Waterfall model (at least in its standard form) is generally unsuitable for large-scale, practical applications in the modern software engineering era.

a) The water fall model is a one design approach, you would start at the analysis phase and cascade down to maintenance. The spiral model emphasizes the cost-analysis of risk vs reward in implementation at any given time. You spiral through objectives, risk assessment, development, and validation multiple times before you get to the first prototype. The AGILE model is a cycle that repeats regularly, structure design usually proceeds from simple to complex.
b) The waterfall model is generally unsuitable for large scale practical applications because of how costly it can become. Once a project reaches its later phases it's extremely costly to go back and change initial elements. Another reason is code deployment happens very late in the development process.

2) (20 pts) a. Explain in 2-4 sentences the crucial differences between an **abstract data type** and **data structure**. **b.** Is every abstract data type limited to being implemented by a single data unique structure? Explain your answer in a few sentences.

a) The main differences between abstract data types and data structures is ADT describes the essential details and hides the complex details at different levels of programming. While data structures go more into depth about the complex details at different levels of programming.
b) Abstract data types are not limited to being implemented by a single data unique structure. ADTs can have different implementations such as: stack, queue, set, and graph. ADTs have different implementations because of the efficiency trade-offs that each implementation has.

3) (20 pts) Define at least four abstractions (from different user/observer perspectives) for the following concepts/entities:

a. A Newly Opened Restaurant in Town **b. A New Network in a Campus Building**

c. A Video Shared Via Social Media **d. A College Basketball Game**

a)
   i) Local foodie
   ii) Business owner: they analyze strengths and weaknesses.
   iii) Investors: evaluate profitability and sustainability
   iv) Health Inspector: requires safety and hygiene checks for the public saftey
b)
   i) Student: a faster more reliable connect for streaming

ii) It Admin: a complex system that requires maintenance and security measures
iii) Faculty Researcher: a platform for high speed data transer
iv) Cybersecurity Expert: A potential vulnerability requiring secure access control and monitoring.

c)

i) Casual Viewer: Entertaining content to watch, share, and comment on with friends and family.
ii) Content Creator: A creative expression, sparking engagement and building an audience
iii) Marketing Analyst: A potential tool for brand awareness, reaching target demographics, and influencing behavior.
iv) Fact-Checker: A source of information requiring verification to combat misinformation and promote truth.

d)

i) Fan: A thrilling spectacle of athleticism, teamwork, and school spirit
ii) Coach: A strategic battle requiring tactical adjustments and player motivation
iii) Referee: A crucial role ensuring fair play, enforcing rules, and maintaining order
iv) Sports Analyst: A technical performance evaluation, analyzing individual plays and team strategies.