ECEN 489 - HW#1: Please answer the following questions:

1) What are major functions of computer networks?

By connecting individual computers together; to share data/information, to share computer/network resources, to communicate across distance.

2) What are the major differences between wired and wireless networks?

Wired networks: using physical wirelines to connect computers; high power supply, high-bandwidth, more reliable connections, high security, location dependent

Wireless networks: using radio media to connect computers without wirelines; Low power (battery supply); Low-bandwidth, less reliable connections, less security, location independent

3) Why do we need the wireless communications networks?

Because of the following advantages:

a. Location independent access to network resources => very convenient for mobile users
b. Cost effective => no wiring or cable connections needed
c. Group communications oriented => easy to implement broadcast & Multicast

4) What's the protocol layering principle and why do we need to use the layered protocol stack?

Divide and conquer ➔ divide a complex network control problems/functions into smaller pieces which are relatively independent to each other so that we can optimize each piece more efficiently. The information exchanges between layers should be minimized.

5) Give your definition of the computer network protocols.

A set of communication rules/standards followed by communicating peers/parties.

6) What does TCP stand for and what are functions of TCP?

Transmission Control Protocol: to provide reliable data transmissions and flow control over unreliable network connections.

7) What are the two major functions for TCP protocol?

Flow control and error control.

8) What does MAC stand for and why do we need the MAC protocol?

Media access control ➔ to coordinate the simultaneous access requests of multiple users/terminals to the shared open-media to avoid collisions.

9) What does PHY stand for and why do we need the PHY layer algorithms?

Physical layer protocol and facility ➔ is the lowest protocol layer supporting the physical signal wave transmissions for the user data.

10) What are the major two types of computer network traffics?

Real-time traffic – such as text data file and software, etc.
Non-real-time traffic – such as video and audio signals

11) What does QoS stand for and what is QoS for the real-time traffic and what's QoS requirement for the non-real-time traffic?

QoS: Quality of Service.
QoS for real-time traffic➔ delay upper-bounded
QoS for non-real-time traffic➔ data loss rate upper-bounded

12) How to classify the flow control mechanisms?

- **Open-loop control scheme**
  - **Flow control function is achieved without using feedback via the closed-loop channel.**
- **Closed-loop flow control scheme**
  - **Flow control adapt its transmission rate to the bottleneck available bandwidth according to the feedback through the closed-loop channel**
    - » **Window-based scheme vs. Rate-based schemes**
    - » **Explicit scheme vs. Implicit scheme**
    - » **End-to-end scheme vs. Hop-by-Hop scheme**
- **Hybrid schemes**
  - **Mixing open-loop flow control with closed-loop scheme**