1. What are the seven layers in the OSI model? Briefly (one to two lines) explain the function of each layer?

Physical Layer: Convert bits to electrical / electromagnetic signals and deliver them over physical media
Data-link layer: converting bits streams to packets or frames (framing) and vice versa; error detection and correction
Network Layer: Deliver network packets from one host to another; addressing; routing; congestion control
Transport Layer: Provide reliable connection oriented service between processes running on different machines; ability to address specific processes (port numbers)
Session Layer: Establishing sessions, dialog control and synchronization
Presentation Layer: Preserve syntax and semantics
Application Layer: Specify protocols for exchanges between applications

2. In the context of DNS, explain the function of the following entities
   (a) Zone Authority
   (b) Authoritative Name Server
   (c) Stub Resolver
   (d) Local DNS

Zone Authority: Responsible for assigning names and creating DNS records for computers and branches within the zone
Authoritative Name server: Carries all DNS records for a zone (the records created by the zone authority); serves DNS records when queried (by domain name and type)
Stub Resolver: Applications running on a computer send their queries to a stub-resolver running on the same host (using gethostbyname() call). The stub-resolver can cache DNS records; it can also direct queries to local DNS servers;
LDNS: Typically operated by ISPs. They receive queries from stub-resolvers. Stub-resolver is made aware of the IP addresses of at least one (typically 2 to 3) LDNS. LDNSs query several authoritative name servers iteratively to resolve the query. For example, to find the IP address of disney.cse.msstate.edu the LDNS first sends a query to a root DNS server (which is authoritative for the zone .) The root DNS server responds with the name (and the IP address) of a DNS server which is authoritative for the zone .edu. The LDNS then queries the .edu DNS server to find the name and address of the DNS server authoritative of msstate.edu. The LDNS then queries the authoritative name server for msstate.edu to get the A-type record for disney.cse.msstate.edu (A-type records indicate IP address).

3. Briefly (on to two lines) explain the following terms
   (a) IMAP
   (b) HTTP
   (c) POP3
   (d) SMTP
   (e) RFC822
   (f) HTML

IMAP and POP3 are protocols for communication between Email clients and Email servers for receiving Emails. Emails are stored in the server persistently. IMAP allows for organizing mails into folders, receiving only part of the mail (just header, first line, or without attachments etc.) POP3 has far less features compared to IMAP. By default Emails transferred from servers to clients are discarded from the server.

SMTP is a protocol for sending email messages, either between mail clients and servers, or for relaying emails between servers.

RFC 822 is a specification of the formats of email messages. HTML is a specification of the format of web pages.

HTTP is a protocol for exchanges between web clients and web servers.
4. One way of classifying the terms above is a \{IMAP, SMTP, POP3, RFC822\} and \{HTTP, HTML\}. Another way is as \{IMAP, POP3, HTTP, SMTP\} and \{RFC822, HTML\}. Explain why both classifications make sense.

HTTP and HTML relate to world wide web. SMTP, RFC822, IMAP and POP3 are related to Email.

HTTP, SMTP, IMAP and POP3 are client-server protocols
RFC822 and HTML are formats for content