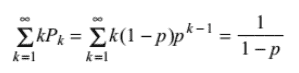
第一章作业如下：

* 1. Five routers are to be connected in a point-to-point subnet . Between each pair of routers, the designers may put a high-speed line, a medium-speed line, a low-speed line, or no line. If it takes 100 ms of computer time to generate and inspect each topology, how long will it take to inspect all of them?  
     答：有AB AC AD AE BC BD BE CD CE DE10种可能的线路，每个线路有高速线路、中速线路、低速线路、不设置线路4种状态，所以一共有4^10=1048576种可能，100ms一种线路，需要花费104857.6s  
     1-2. What are two reasons for using layered protocols? What is one possible disadvantage of using layered protocols?  
     答：通过使用分层协议可以把复杂的设计问题划分成较小的易于处理的小问题；分层意味着某一层协议的改变不会影响高层或底层的协议，具有灵活性。

一个可能的缺点是分层设计的系统的性能可能会不如整体设计的系统性能。  
1-3. What is the principal difference between connectionless communication and connection-oriented communication? Give one example of a protocol that uses  
(i) connectionless communication  
(ii) connection-oriented communication  
答：主要区别有两点：

其一：面向连接通信分为三个阶段，第一是建立连接，在此阶段，发出一个建立连接的请求，只有在连接成功建立之后，才能开始数据传输，这是第二节点。接着，当时护具传输完毕，必须释放连接。而无连接通信没有这么多节点，它直接进行数据传输。

其二：面向连接的通信具有数据的保序性，而无连接的通信不能保证接收数据的顺序与发送数据的顺序一致。

例子：TCP协议是面向连接的，IP和UDP协议是一种无连接协议。  
1-4. In some networks, the data link layer handles transmission errors by requesting that damaged frames be retransmitted. If the probability of a frame's being damaged is p, what is the mean number of transmissions required to send a frame? Assume that acknowledgements are never lost.  
答：  
1-5. A system has an n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers?

答：每一层加上长度为n字节的报文头，共有n层，字节的报文头，共有hn,全部消息大小为(M+hn)，那么报文头所栈的网络带宽比例为：hn/(M+hn)

1-6. What is the main difference between TCP and UDP?  
答：TCP是面向连接的，而UDP是无连接的服务  
1-7. When a file is transferred between two computers, two acknowledgement strategies are possible. In the first one, the file is chopped up into packets, which are individually acknowledged by the receiver, but the file transfer as a whole is not acknowledged. In the second one, the packets are not acknowledged individually, but the entire file is acknowledged when it arrives. Discuss these two approaches.

答：如果网络丢包率较大，使用第一种方案，独立确认每一个包，所以丢失的包可以重传。另一方面，如果网络稳定性好，使用第二种方案，最后确认整个文件可以节省带宽。但是在这种策略下，即使有单个分组丢失，也需要重传整个文件。

1-8. An image is 1024 X 768 pixels with 3 bytes/pixel. Assume the image is uncompressed. How long does it take to transmit it over a 56-kbps modem channel?  
Over a 1-Mbps cable modem?  
Over a 10-Mbps Ethernet?   
Over 100-Mbps Ethernet?  
Over gigabit Ethernet?

答：该图像的数据量是024\*768\*3=2359296 字节，即是2359296\*8=18874368 bit

56kbps 的调制解调器传输此图像需要时间为：18874368/56/1024=329.14 秒

1Mbps 的线缆调制解调器传输此图像需要时间为：18874368/1024/1024=18 秒

10Mbps 的以太网传输此图像需要的时间为：18874368/10/1024/1024=1.8 秒

100Mbps 的以太网传输此图像需要的时间为：18874368/100/1024/1024=0.18 秒

1-9. Suppose the algorithms used to implement the operations at layer k is changed. How does this impact operations at layers k − 1 and k + 1?

答：不会影响

采用分层的设计，每一层的目的都是向其上一层提供一定的服务，而把如何实现这一服 务的细节对上一层加以屏蔽，某一层操作算法的改变不会影响高层或底层的协议，所以 对第 k 层操作的算法发生了变化，不会影响到第 k-1 和第 k+1 层的操作。

1-10. Suppose there is a change in the service (set of operations) provided by layer k. How does this impact services at layers k-1 and k+1?

答：不会影响k-1层，会影响k+1层。