

THE DESIGN AND IMPLEMENTATION OF NETWORK SERVICES
CS 302 Instructor: George Porter Spring 2005
Prerequisite Exam

The purpose of this exam is to test your knowledge of the underlying networking concepts that we will be relying on in this course. This test won't count toward your grade in this course. Instead, it will be graded on the following scale:

- Check Plus: You should have all the tools you need for this course
- Check: Please consider taking this course, however, please meet with the instructor to discuss ways to fill in any missing concepts (re-read relevant chapters from Peterson and Davie)
- Check Minus: It is unlikely that you have the prerequisite knowledge: you will need to meet with the instructor if you still want to take the course.

1 – Switching (10%)

- a) What is the difference between a switch, a router, and a hub? Between a bridge and a switch?
- b) What do switches implement a spanning tree protocol? Draw a network diagram that highlights the problem that STPs solve, and describe how a STP would fix the problem in your design.

2 – Routing (20%)

- a) What is CIDR? What was the address allocation structure that CIDR replaced?
- b) Compare and contrast RIP and OSPF. What algorithms would you use in each case to find appropriate next hop routers to send traffic to? [hint: one is named after a Dutch Turing Award winner]
- c) What is the count to infinity problem? Draw a diagram of a network and demonstrate how that problem could occur. How can you mitigate against the count to infinity problem?

3 – TCP (30%)

- a) Define flow control. Define congestion control. What aspects of TCP address each problem? Be specific in regards to fields in the TCP header.
- b) TCP is known to perform poorly over wireless links. What aspect of the TCP protocol causes this? How could you change TCP to avoid this problem (or, what well known TCP extensions might help?) If you couldn't change TCP, and couldn't use any extensions, what could you do at the application layer to mitigate the problem?

4 – Socket Programming (20%)

- a) What does the **socket()** call do? The **select()** call? The **bind()** call?