COMPUTER SCIENCE E-1

Understanding Computers & the Internet

PROBLEM SET 3

Due Monday, March 4 at 5:30pm

15 questions, out of 50 points

Academic Honesty

All work that you do toward fulfillment of this course's expectations must be your own unless collaboration is explicitly allowed by the staff. Viewing, requesting, or copying another individual's work or lifting material from a book, magazine, website, or other source—even in part—and presenting it as your own constitutes academic dishonesty, as does showing or giving your work, even in part, to another student.

Similarly is dual submission academic dishonesty: you may not submit the same or similar work to this course that you have submitted or will submit to another. Nor may you provide or make available solutions to homework or exams to individuals who take or may take this course in the future. Moreover, submission of any work that you intend to use outside of the course (e.g., for a job) must be approved by the staff.

If in doubt as to the appropriateness of some act, contact the staff. All forms of academic dishonesty are dealt with harshly.

Submission Instructions

To submit this problem set, head to E-1 Submit (http://cse1.net/submit), where you can upload a PDF, Word Document, or text files. PDF files are preferred. Don't forget to also complete this problem set's form at http://cse1.net/forms/pset3!

Route 66

1. **(3 points)** Recall that sites like http://en.dnstools.ch/visual-traceroute.html and http://traceroute.monitis.com let you run traceroute from within your browser! In approximately which geographic location are each of the following sites hosted? What is an IP address associated with each of these sites?

i. cse1.net

ii. mcdonalds.com

iii. mlb.com

2. **(3 points)** What's an IP address? What's the difference between IPv4 and IPv6? What does it mean for IPv6 to be necessary?

3. **(3 points)** Based on the maps above, it looks like many requests take a very roundabout path to their destination. Why might this be the case? Do all routers know how to get to every IP address on the Internet?

Private Eye-P

4. **(2 points)** What's the difference between a public IP and a private IP? What are some common prefixes for private IP addresses?

5. **(3 points)** My computer is on a network using NAT. What can you say about my computer's IP address? How does a server's response make its way back to my computer?

6. **(2 points)** How does your computer acquire an IP address on a network using DHCP?

Speed Racer

7. **(3 points)** Let's test the Internet connection you have at home or at work. First, what are the download and upload speeds of your connection, according to your ISP? Now, using http://www.speedtest.net or http://www.whatismyip.com/speed-test, what are the actual download and upload speeds of your Internet connection? Is there a difference between what your ISP reports and what the tests report?

A System for Domains

8. **(2 points)** Why is it important that root DNS servers are kept secure? What could happen if one were ever compromised?

9. **(2 points)** What's the difference between an A record and a CNAME record? When might you want to use one over the other?

10. **(2 points)** When you change DNS record, there's a good chance the change in your domain or subdomain won't be reflected immediately when you access the Internet. Why not?

11. **(1 point)** I'm lucky enough to say that my initials are a recognized TLD! (I'll have to fly to Turkmenistan to thank them someday.) Can you say the same for your initials?

Debate Team

12. **(5 points)** Let's talk about net neutrality. If you're unfamiliar with the topic, you might want to curl up with some readings like http://theopeninter.net, http://www.scientificamerican.com/article.cfm?id=long-live-the-web, and http://arstechnica.com/tech-policy/news/2011/01/huge-isps-want-per-gb-payments-from-netflix-youtube.ars. In a short paragraph, tell us where you stand on the issue and why! To get you thinking, consider how net neutrality affects economics, freedom, and fairness from an Internet user's perspective!

13. **(2 points)** Why might a company like Google or Facebook want to expose its data via an API?

Putting it All Together

14. **(5 points)** You just typed http://youtu.be/C_S5cXbXe-4 into your web browser's address bar and hit Enter, at which point a YouTube video appears on a page. In a technically detailed paragraph, what happened? You can assume that you are indeed connected to the Internet and that URL points to a valid page on YouTube (which it does, so you should click it). Your response should reference terms like routers and DNS!

15. **(0 point)** Head over to Problem Set 3's form (http://cse1.net/forms/pset3) to answer some questions about the course so far!