

COMPUTER SCIENCE E-1

Understanding Computers & the Internet

PROBLEM SET 4

Due Monday, March 25 at 5:30pm

14 questions, out of 42 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 file. PDF files are preferred. Because Monday, March 11 is our first exam, this problem set will not be due until Monday, March 25. However, if you'd like to receive qualitative feedback before the exam, you can submit this problem set before Friday, March 8, and you will receive feedback by Sunday, March 10.

Protocol by Numbers

1. (2 points) We've seen a whole lot of acronyms that end in the letter "P": DHCP, HTTP, SMTP, POP, IMAP, TCP, and IP. All the other letters of the alphabet must be getting jealous. What do we mean when we say something is a protocol? That is, what do all of these technologies have in common?
2. (3 points) What's a web browser? If you've ever contacted the support email address for a website, you were probably asked what web browser you were using. Why might this information be helpful to diagnose a problem with a website?

One Small Request

3. (3 points) Write an HTTP request (using the GET method) that gets the content of the web page at <http://www.catgifpage.com/>. Also explain what each line in your HTTP request means!
4. (3 points) Write an HTTP request (using the POST method) that sends the key email with the value `unicodelovehotel@gmail.com` to the web page at <http://raspberrycats.wordpress.com/>. Also explain what each line in your HTTP request means!
5. (2 points) I made a request to a web page, but my browser received the below HTTP response. What's the meaning of this response?

```
HTTP/1.1 500 Internal Server Error
Server: Apache
Date: Mon, March 4 2013 00:00:00 GMT
```

6. (3 points) I tried a different URL, and this time, I got the below HTTP response. What does this mean, and what will my web browser most likely do?

```
HTTP/1.1 301 Moved Permanently
Server: Apache
Date: Mon, March 4 2013 00:01:00 GMT
Location: http://cse1.net
```

Inbox Zero

7. (4 points) Using my primary email address, `unicodelovehotel@gmail.com`, I sent a message to `someone@example.com`. In a succinct but technically detailed paragraph, describe how my email ultimately reaches `someone@example.com`'s inbox.

8. (3 points) What's the difference between a stack and a queue? What's a situation where a stack would be more appropriate than a queue? How about a situation (other than the line at the Rock 'n' Roller Coaster or other amusement park rides) where a queue would be more appropriate than a stack?

9. (3 points) Unlike HTTP headers, email headers can be repeated several times with different values. Why is the Received header usually found more than once in an email once it's been delivered?

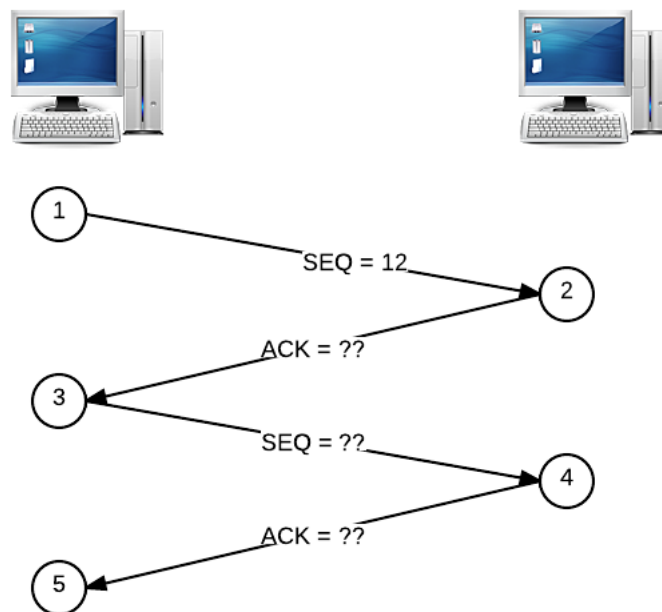
10. (2 points) What are some differences between POP3 and IMAP? What are some features IMAP provides that POP3 doesn't?

11. (2 points) What's a phishing attack? Since I don't have access to Bill Gates's inbox, I could never send email from billg@microsoft.com, right?

Mission Control

12. (4 points) When we say that TCP ensures reliable data transfer, what two guarantees are we making about the delivery of segments? What's an ACK, and how does it relate to these guarantees? Similarly, what is a sequence number, and how does it relate to these guarantees?

13. (3 points) The below depicts two TCP segments being transmitted from one host to another. Both segments are 32 bytes in size. Fill in the 3 blanks below, and explain your reasoning for the numbers you choose!



14. (5 points) This time, we want to send three TCP segments, but one of the segments got dropped on its way from one host to another. Again, all segments are 32 bytes in size. Fill in the 3 blanks below, and explain your reasoning for the numbers you choose!

