

COMPUTER SCIENCE E-1

Understanding Computers & the Internet

EXAM II

Name:

You will have two hours to complete the exam. This exam is closed-book, so no notes, calculators, phone-a-friend lifelines, or additional aids will be allowed. Answer all questions directly on the exam. Scratch paper can be found at the end of the exam. Please complete the following.

“I understand that some students may not be taking this exam at the same time as I am. I affirm that I will neither reveal the contents or difficulty of this exam to any such student nor discuss it with any such student.”

Signature: _____

Final Score

(for staff use only)

Multiple Choice

(1 point each) Circle the choice that best answers the question.

1. Vf E.W. shaal?
 - a. Bs pbhefr ur vf
 - b. Abg ng nyy
 - c. Ora vf shaavre
 - d. Pvepyr guvf bar

2. Using what technology might I allow a Facebook app to access my data?
 - a. OAuth
 - b. CSRF
 - c. CISP
 - d. Subdivision

3. Which of the following is **not** a video container?
 - a. AVI
 - b. x264
 - c. MP4
 - d. MOV

4. Which of the following is **not** addressed by DMCA?
 - a. Copyright
 - b. Circumvention
 - c. Cyber intelligence
 - d. DRM

5. Assuming a 26-letter alphabet, how many n-letter keywords are possible when using Vigenère's cipher?
 - a. 26
 - b. n
 - c. n^{26}
 - d. 26^n

6. Which of the following is **not** one of the four design principles?
- a. Repetition
 - b. Proximity
 - c. Consistency
 - d. Visibility
7. Which of the following is used to represent three-dimensional objects?
- a. Psychoacoustics
 - b. Mesh
 - c. Spectrogram
 - d. Kerning
8. Which of the following graphics formats supports transparency?
- a. PNG
 - b. JPG
 - c. BMP
 - d. PPM
9. Which of the following refers to a list of items, with respect to a computer program?
- a. Condition
 - b. Array
 - c. Loop
 - d. Event
10. Which HTML tag can be used to add an image to a page?
- a. image
 - b. link
 - c. a
 - d. img

Buzzwords

(3 points each) Much like HP's claims regarding "that cloud thing everyone is talking about," each of the following statements tries to use some technological buzzword. For each statement, state whether the author seems to know what he or she is talking about, and if not, explain why in 1–2 sentences.

11. A co-worker sent me a Word document, but I don't have Word on my computer, so I changed the file extension to ".pdf" in order to open it.

12. If a site is using HTTPS, then it must be free from security vulnerabilities.

13. I encrypted some text with the Caesar cipher, and then I encrypted the resulting ciphertext with the Caesar cipher again, using a different key this time. Since I used two layers of encryption, the ciphertext will be harder to crack.

14. My video player supports every container format out there, so I'll be able to play any video my friends send me.

15. XSS is the next version of CSS. It adds some X-tra features to CSS.

16. When I edit the name and artist of a song using iTunes (or the media player of your choice), those changes must be stored in a separate file, since MP3s contain only audio data.

17. cats.com allows me to use Facebook to log in to my account. I just read that the database for cats.com was compromised yesterday, so my Facebook password could have been stolen.

18. I emptied all of the files in my computer's recycle bin, so they're gone forever.

Short Answer

(2 points each) Answer each of the following questions using 2–3 sentences.

19. How does HTTPS protect against session hijacking?

20. What is the difference between raster graphics and vector graphics? How are images represented with raster graphics, and how are images represented with vector graphics?

21. Compare and contrast CPUs and GPUs.

22. What information is typically recorded in a server's log file when you make HTTP requests? List at least three pieces of information that can be included in a log file.

23. What is color depth? For the image format of your choice, what is a typical value for a color depth?

24. What is a variable, with respect to a computer program?

25. What does it mean to wipe a hard drive?

From left to right, below are the flags of Austria, Ireland, and the United Kingdom, respectively. Whether printed here in color or in black and white, assume that these flags have been stored on disk in color as GIFs.



26. Which of these three GIFs most likely takes up the fewest bytes on disk? Why?

27. Which of these three GIFs most likely takes up the most bytes on disk? Why?

Malware Detective

(2 points each) Below are several hypothetical pieces of malware. Characterize each as a virus, worm, spyware, trojan, or adware, and explain your reasoning in 1–2 sentences. Note that not all of these descriptors are mutually exclusive; if the case might fit more than one malware category, you need only tell us about one!

28. Without my knowledge or control, my computer has been making a huge number of requests to `http://whitehouse.gov`. Turns out my co-workers' computers have been doing the same, and now that website isn't responding.

29. I downloaded a cool new app that allows me to add cats to any photo in my collection. Despite my new library of cat-filled photos, it seems like my computer has slowed down tremendously, and all my music files have been deleted.

30. My friend emailed me a new Simpsons screensaver, but when I opened it up, every file on my hard drive was replaced with a picture of Homer. D'oh!

31. I logged in to my bank account yesterday, and all my money was gone! Looking at my network's traffic, it looks like all of my keystrokes have been sent to `http://badguy.com` for the past week.

32. It looks like my Internet Explorer homepage has been changed to `http://buystuffhere.com`, and suddenly I can't browse the web without being inundated with pop-ups.

Behind the Scenes

Here at E-1, we have a super secret staff website that requires a login to access. Since the semester is over, here's what the users table in our database looks like.

username	password	role
tommy	grumpycat	instructor
rj	XZq5% <u>m</u> Bn\$vx9	tf
ben	password123	tf

(2 points each) What will happen when each of these queries is run? Explain what will be returned from the database or how the database will be modified.

33. `SELECT * FROM users;`

34. `SELECT username FROM users WHERE role = 'tf';`

35. `UPDATE users SET password = 'ben' WHERE username = 'rj';`

36. (3 points) When Ben logs into the site, the following query will be run:

```
SELECT * from users WHERE username = 'ben' AND password = 'password123';
```

Given this query, what password might you type in order to perform a SQL injection attack? What will happen when your attack is run?

37. (2 points) It looks like we're storing passwords in the staff database. Suggest a change that would provide an additional layer of security for our users' passwords.

Long Answer

(5 points each) Answer each of the following questions using 3–5 sentences.

38. How do sessions allow you to stay “logged in” to a website as you’re browsing it? What are some potential security vulnerabilities with sessions?

39. My friend just sent me a bitmap called `shockedcat.bmp`. What’s inside of this file? That is, how is the image of one of my favorite cats stored within a bitmap file?

40. What are three of the ten usability heuristics? Give an example of each of the three heuristics you choose.

41. What is a web proxy? How do web proxies work? Why might you want to use a web proxy?

42. MP3 files are typically much smaller than equivalent PCM files without a large loss in sound quality. Explain how MP3 compression works: how is it possible to compress a sound file without degrading quality?

43. What is a CSRF attack? Give an example of how an insecure site might be vulnerable to CSRF attacks. How can sites protect against CSRF attacks?

44. What's the difference between lossy compression and lossless compression? Give an example (taken from any multimedia topic) of lossless compression and lossy compression. In what situations might you prefer lossy compression, and in what situations might you prefer lossless compression?

45. Do Wi-Fi security algorithms like WEP, WPA, and WPA2 use symmetric or asymmetric key cryptography? How about GPG? Explain both of your answers.

46. Explain the role of cookies in targeted advertising. How can advertisers use cookies to track your browsing behavior?

Tag, You're It

47. (5 points) Below is a snippet of invalid HTML. Correct at least five issues with the following HTML!

```
<html>
  <title>
    <head>R.J.'s home page!</head>
  </title>
  <body>
    <h1>R.J. Aquino
    <a src='http://benshryock.com'>Click here!</a>
    <javascript>
      alert('Welcome to my page!');
    </javascript>
  </body>
</html>
```

(1 point each) Consider the following HTML tag.

```
<link rel='stylesheet' src='styles.css' />
```

48. What is the name of this tag?

49. What are the attributes of this tag?

50. What are the values of those attributes?

51. Why might a web developer want to include this tag on a web page? That is, what purpose does this tag serve?

52. Should this tag eventually be followed by `</link>`? Why or why not?

Cascade Badge

(2 points each) Write a CSS selector to select each of the following elements from an HTML document.

53. All of the `img` tags.

54. The tag with an ID of `grumpycat`.

55. All `li` tags inside elements with the class `list`.

Scratch That

(1 point each) Below are a series of Scratch blocks. Label each block as a “statement,” “condition,” “loop,” or “Boolean.”



```
say You're almost done!
```

62.

(4 points each) Below are a few Scratch programs, but... they don't work! Explain why each program does not work, and suggest changes to fix each.

```
when clicked
  set counter to 10
  say Countdown to liftoff! for 2 secs
  repeat until counter = 0
    say counter for 1 secs
    change counter by 1
  say Blastoff! for 2 secs
```

63.

```
when clicked
  repeat until touching mouse-pointer ?
    if touching mouse-pointer ?
      play sound meow
```

64.

Scratch Paper