

Exam 1

25 October 2006

Directions.

- Do not turn this page over until told to do so.
- This exam is closed-book. You may not use anything other than a pen or pencil to complete it.
- You have exactly 60 minutes to complete the exam.
- If you have a question during the exam, raise your hand or quietly come down to the front of the lecture hall to speak with a member of the teaching staff.
- If you finish the exam within 55 minutes, you may come down quietly to the front of the lecture hall to turn in your exam. If you finish the exam within the last 5 minutes of the exam period, however, please remain in your seat until the period's end, so as not to disturb other students during the final moments of the exam.
- Close your eyes, take a deep breath, and think to yourself: "I'd rather be anywhere else on (Google) Earth right now."



Please complete the following. (Print clearly.)

Name: _____

"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, in agreement with the above: _____

for staff use only

final score out of 100

Multiple Choice. (1 point each.)

For each of the following questions or statements, circle the letter (a, b, c, or d) of the one response that best answers the question or completes the statement.

1. A floppy disk can store roughly 1.44
 - a. B.
 - b. KB.
 - c. MB.
 - d. GB.

2. Which of the following quantities is largest?
 - a. 1 Gb
 - b. 1 TB
 - c. 1 MB
 - d. 1 Mb

3. The most common topology for networks today is a
 - a. star.
 - b. ring.
 - c. bus.
 - d. loop.

4. How many bits are in a byte?
 - a. 1,000,000
 - b. 1,024
 - c. 1
 - d. 8

5. CAT5 cables offer throughput as high as
 - a. 10 megabits per second.
 - b. 10 megabytes per second.
 - c. 100 megabits per second.
 - d. 100 terabytes per second.

6. 802.11b offers throughput as high as
 - a. 1.5 Mbps.
 - b. 11 Mbps.
 - c. 54 Mbps.
 - d. 100 Mbps.

for staff use only
points off on this page

—

7. 802.11g offers throughput as high as
 - a. 1.5 Mbps.
 - b. 11 Mbps.
 - c. 54 Mbps.
 - d. 100 Mbps.

8. When buying a hard drive these days, you needn't spend more than
 - a. \$35.00 per GB.
 - b. \$0.35 per GB.
 - c. \$0.35 per MB.
 - d. \$35.00 per MB.

9. Who reminds David of a floppy disk?
 - a. Eugenia Kim
 - b. Rei Diaz
 - c. Wooly Willy
 - d. Dan Armendariz

10. When you visit <http://www.whitehouse.gov/>, which protocol does not get involved?
 - a. FTP
 - b. IP
 - c. HTTP
 - d. TCP

for staff use only

points off on this page

—

True or False. (1 point each.)

For each of the following statements, circle either T if the statement is true or F if the statement is false.

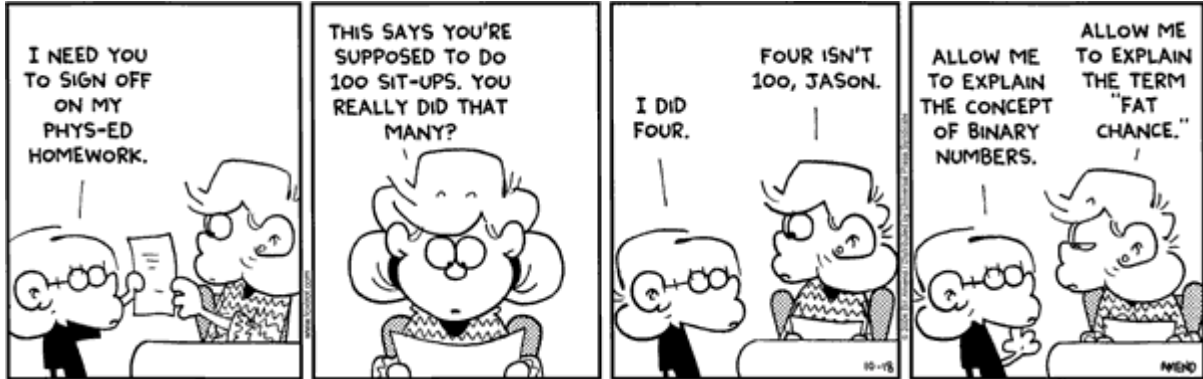
11. T F The largest digit in the binary system is 1.
12. T F The largest digit in the decimal system is 10.
13. T F A CPU's speed is usually measured in Gbps.
14. T F Virtual memory treats free space on a hard drive as ROM.
15. T F The decimal value of 'C' in ASCII is 67.
16. T F During much of Lecture 5's video, a plastic pumpkin appears on screen.
17. T F SMTP operates on TCP port 80, whereas HTTP operates on TCP port 25.
18. T F IP addresses are 32 bits long.
19. T F jon@thedailyshow is a syntactically valid email address.
20. T F Gerry did great on Problem Set 1 but all he won was a t-shirt.
21. T F CPUs made by Intel can be found in both PCs and Macs these days.
22. T F THIS STATEMENT IS IN ALL CAPS BECAUSE DAVID WAS ANGRY WHEN HE WROTE IT.
23. T F Because its TLD is tv, Turner Network Television's webserver, www.tnt.tv, must be located in the country of Tuvalu.
24. T F Ethernet's RJ-45 connectors are wider than phones' RJ-11 connectors.
25. T F The Internet grew out of a U.S. military project.
26. T F Only non-profit organizations can own domains ending in .org.
27. T F Only ISPs can own domains ending in .net.
28. T F Only corporations can own domains ending in .com.

for staff use only
points off on this page

—

Laugh if you're a geek. (4 points.)

29. Recall the comic strip below from Lecture 1.



Why is this strip funny? In other words, explain in a few sentences how binary numbers work by explaining why 100 does, in fact, represent the value we know as four.

for staff use only
points off on this page
—

The same road to Harvard as last year. (4 points.)

30. Consider the below, an excerpt from the output of `tracert` on a PC that details the path along which data might travel from an apartment in Somerville, Massachusetts, where the resident's personal computer has a cable modem through RCN (a local ISP), to Harvard's FAS webserver.

```
tracert to www.fas.harvard.edu from an apartment in Somerville, Massachusetts
 1 192.168.22.1 (192.168.22.1) 77.460 ms 31.353 ms 28.117 ms
 2 10.65.92.2 (10.65.92.2) 24.109 ms 22.260 ms 21.597 ms
 3 10.65.92.1 (10.65.92.1) 23.091 ms 22.201 ms 20.137 ms
 4 core1.mbo.ma.rcn.net (209.6.2.234) 22.092 ms 23.794 ms 23.544 ms
 5 Serial1-1-1.GW3.BOS1.ALTER.NET (137.39.135.213) 26.230 ms 69.590 ms 27.005 ms
 6 126.ATM2-0.XR2.BOS1.ALTER.NET (146.188.177.222) 24.562 ms 27.109 ms 29.076 ms
 7 290.ATM6-0.XR2.NYC1.ALTER.NET (146.188.176.186) 41.740 ms 28.623 ms 28.095 ms
 8 194.ATM10-0-0.GW2.NYC2.ALTER.NET (146.188.178.149) 34.044 ms 32.331 ms 29.393 ms
 9 att-new-york-gw.customer.ALTER.NET (157.130.0.14) 41.347 ms 30.758 ms 31.699 ms
10 gbr2-p00.n54ny.ip.att.net (12.123.1.50) 50.857 ms 54.453 ms 54.322 ms
11 gbr1-p50.cb1ma.ip.att.net (12.122.2.14) 54.760 ms 56.329 ms 55.154 ms
12 ar3-a300s1.cb1ma.ip.att.net (12.127.5.37) 56.956 ms 63.601 ms 58.570 ms
13 12.126.99.6 (12.126.99.6) 57.018 ms 58.180 ms 67.079 ms
14 192.5.66.10 (192.5.66.10) 58.686 ms 58.594 ms 58.052 ms
15 sc-gw.fas.harvard.edu (140.247.20.2) 57.417 ms 87.999 ms 104.266 ms
16 * scmr-gw.fas.harvard.edu (140.247.6.1) 175.951 ms 103.100 ms
17 * www.fas.harvard.edu (140.247.30.60) 195.229 ms 182.208 ms
```

What do, say, line 7's three measurements in milliseconds (ms) represent? What might explain why one of those three is notably larger than the other two?

for staff use only
points off on this page

Connect the Dots Hardware. (16 points.)

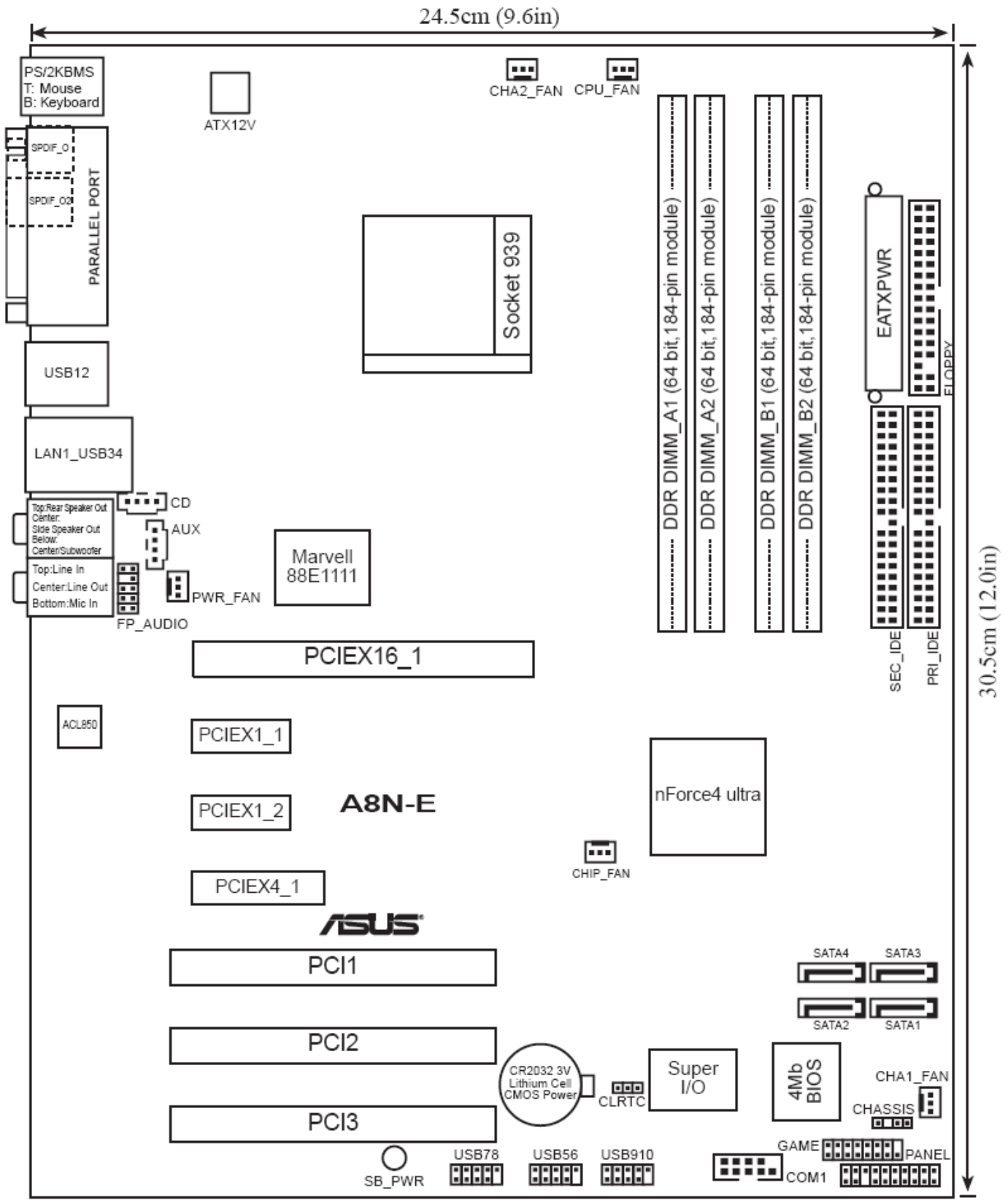
31. Per Lecture 2, among David's recent purchases was an ASUS A8N-E Socket 939 NVIDIA nForce4 Ultra ATX AMD Motherboard (pew, that's a mouthful), a diagram of which appears on the page that follows. Although most of this motherboard's connectors are labeled, it's not clear from most of those labels exactly what should be connected to them.

Help a guy out by telling him exactly what goes where. Specifically, tell David, by writing on the following page's diagram, where each of the pieces of hardware below can or should be connected on the motherboard, making clear with arrows exactly what goes where.

If some piece of hardware could be connected to more than one connector depending on its design, draw your arrow to just one of those connectors. You may, however, draw two arrows to the same connector if two pieces of hardware could be connected to the same connector.

- CD-RW drive
- CPU
- digital camera
- hard drive
- PCIe video card
- printer
- RAM
- TV card

<p>for staff use only</p> <p><i>points off on this page</i></p> <p>—</p>



Just the other day... (3 points each)

Increasingly clear to you should be who does and does not know what he or she is talking about when it comes to computers and the Internet. For each of the quotes below, state whether the person knows or doesn't know what he or she is talking about. If the person doesn't know what he or she is talking about, explain why in one to three sentences.

32. Just the other day, David said "I just bought a dual-core HDD!"
33. Just the other day, Dan said "David's an idiot." Okay, just kidding. Just the other day, Dan said "I just bought a DVD-R drive so I can burn my own DVDs!"
34. Just the other day, Eugenia said "My cable modem lets me download at speeds up to 6 Gbps!"
35. Just the other day, Rei said "The Internet and the World Wide Web are the same thing."

for staff use only

points off on this page

—

Know what you're talking about? (2 points each.)

Each of the items below is usually described in terms of its capacity and/or speed. For each item, tell us what a typical capacity or speed is these days for that item. (If an item can be described in terms of its capacity or its speed, choose just one.) Take care to provide not only numbers but also units. It's fine to abbreviate units (*e.g.*, "GHz" for "gigahertz"). But do be careful. For instance, "Mb" is not the same as "Mbps"! For clarity's sake, we've offered descriptions for two of the items ourselves.

- 36. cable modem _____
- 37. CD-RW disc _____
- 38. CPU _____
- 39. dialup modem 56 Kbps
- 40. DSL modem _____
- 41. DVD-R disc _____
- 42. HDD 60 GB
- 43. L1 cache _____
- 44. L2 cache _____
- 45. RAM _____
- 46. WiFi network _____

<p>for staff use only <i>points off on this page</i></p> <p>—</p>
--

Rapid Fire. (2 points each.)

The following questions are intended to solicit (nearly) instantaneous responses from you. We expect (and will accept) no more than three sentences for each of your answers.

47. What's a podcast?

48. Why do some hard drives (even in good condition) make noise when you delete lots of files?

49. What's technically wrong in the photograph (that David took this summer outside of a Bed Bath & Beyond) at right?



50. Recall that 2^{24} equals 16,777,216. Roughly speaking, what do 2^8 , 2^{16} , and 2^{32} equal?

for staff use only
points off on this page
—

51. Why do advertisements for websites rarely mention `http://` these days?
52. Upon receipt of spam, why should you generally not click a link in the spam in order to unsubscribe?
53. Why do some websites' addresses begin with `www` while others do not?
54. Name two characters besides letters and numbers that can appear in valid email addresses.
55. Upon receipt of a packet, how does a router know where to send that packet next?

Extra Credit. (5 points.)

Only attempt to answer the following three questions if you have completed the rest of the exam and have double-checked your answers! Collectively, these questions are only worth 5 points. The rest of the exam, mind you, is worth 100 points!

56. Write ninety thousand two hundred ten as a 32-bit binary value.

57. Propose three tricks that a computer could use to determine whether an email is spam.

58. What in the world (or where in the world) is the below?



for staff use only
extra points for this page

+