CMPSCI 120
Fall 2017
Midterm Exam #1
Solution Key
Friday, October 6, 2017
Professor William T. Verts

<1> 30 Points – Answer any 30 of the following questions. Answer more for extra credit. Blank answers will be ignored. Correct answers gain 1 point. Incorrect answers lose one-half point (but the total will not go below zero). For example, if you answer all 35 questions, and get 25 correct but the other 10 are incorrect, the final score for this question will be 25-(10/2) = 20.

Yourself	Who is the easiest person in the world to fool?
Pareidolia	What is it called when I see Elvis in my cornflakes?
NO	Do people tend to change their opinions when given evidence contrary to their strongly-held beliefs?
8	How many bits are in a byte?
256	How many distinct values can be stored in a byte?
FF	What is the hex value of the largest number storable in a byte?
NO	Can the hex value **1AE** be stored in a byte?
2	How many hex digits will fit into a byte?
9D	What is the equivalent hex value to the binary number **10011101**?
93	What is the equivalent hex value to the decimal number 147?
4	How many bytes make up an IPv4 address?
128	How many bits make up an IPv6 address?
Star	What network type has a big central computer with many terminals?
Point-to-Point	What network type has a direct wire between each pair of computers?

Token Ring	What network type is in the form of a circle?
Collision	What is it called when computers talk simultaneously on Ethernet?
DNS	What service maps URLs into IP addresses?
NO	My solar panel controller is at IP address 192.168.1.100 – can anyone on the Internet see my panels except me?
YES	Can all machines connected to a hub see each other's traffic?
NO	Can all machines connected to a switch see each other's traffic?
YES	Can a computer with 802.11g wireless talk to an 802.11b router?
Cache Poisoning	What is it called when bad guys make DNS map URLs to wrong IPs?
Packet Sniffer	What is the program called that watches packet traffic on a server?
T	T/F: A router can hide a local network behind a single IP address.
F	T/F: All packets are guaranteed to reach their destination.
T	T/F: Packets may arrive at their destination out of order.
F	T/F: The Internet completely fails if someone nukes a major city.
T	T/F: Most of the email traffic worldwide is SPAM.
Postcard	Is an email more like a letter in an envelope or a postcard?
NO	Is it a good idea to send sensitive information in a plain email?
NO	You get an email from your boss with an attachment and the subject line "I love you". Is it a good idea to open the attachment?
Host Address	In a URL, what is the **`www.cs.umass.edu`** part called?
Web Spider/Crawler	What kind of program follows links to catalog many Web pages?
NO	Should you trust emails that say, "Click here to check your account"?
Deprecated	What is it called when an HTML tag is discouraged from being used?

<2> 15 Points – (3 points each)

Here is an IPv4 address, in binary, using ***classful addressing***:

`10000000.00001111.11110000.11110000`

A. What is the class represented?

Class B (Starts with `10`)

B. What is the network identifier (write the number in binary)?

`00000000001111` (6 bits from first byte, all 8 of second byte)

C. What is the machine identifier (write the number in binary)?

`1111000011110000` (all of third and fourth bytes)

Here is an IPv4 address using ***CIDR***:

`106.147.15.123/23`

D. How many bits are in the machine identifier?

9 (32 bits total: 23 used by network identifier)

E. How many distinct machine identifiers can there be for this domain?

$2^9 = 512$ (Accept either answer)

<3> 15 Points – Write an HTML fragment (not a complete Web page) that links to **`www.smash.com`** when you click on the image named **`Hulk.jpg`** (the image file is in the same folder as the referring document).

```
<A HREF="http://www.smash.com/">
    <IMG SRC="Hulk.jpg">
</A>
```

4 Points for `<A HREF="_____">`
- -1 for use of wrong attributes
- -1 for missing quotes
- -1 for missing angle brackets
- -1 for any other syntax errors

3 Points for `http://www.smash.com/` (The trailing slash is optional)
- -1 for omitting `http://` part
- -1 for any other syntax errors, such as slashes in the wrong direction

4 Points for `<IMG SRC="_____">`
- -1 for use of wrong attribute (such as `HREF` instead of `SRC`)
- -1 for missing quotes
- -1 for missing angle brackets
- -1 for any other syntax errors

3 Points for `Hulk.jpg`
- -1 for capitalization errors
- -1 for changing file name (such as `Hulk.gif`)
- -1 for any other syntax errors

1 Point for `</A>`
- -1 for missing angle brackets or slash

In addition, remove 3 points for the inclusion of any other HTML that is not necessary to the solution of the problem.

<4> 10 Points – Mark up the following text so that the phrase **Web page** is italic, the phrase **COMPSCI 120** is in bold, and the word **really** is both bold and italic. Use a non-deprecated tag to underline the word **neat**. Add a deprecated attribute to make the background of the page yellow.

```
<BODY BGCOLOR="yellow">

    This  is  my  fancy  <I>Web  page</I>

    for  my  <B>COMPSCI  120</B>  class.

    It  contains  lots  of  <B><I>really</I></B>

    <INS>neat</INS>  content.

</BODY>
```

Remove 1 point per error, but do not go below zero.

Note: the bold-and-italic may be either **<B><I>…</I></B>** or **<I><B>…</B></I>**, but may not be <B><I>…</B></I> or <I><B>…</I></B>. If this is found, remove 1 extra point from the total, but do not go below zero.

<5> 5 Points – Very Short Answer – Many years ago I saw magician James Randi interviewing a couple of Russian "psychic" women who claimed to be able to determine a person's personality from a photograph. When shown a picture of serial killer Ted Bundy, they went on for several minutes about how nice he was, and how he was obviously a good person. Only after being told who he was and what he did, they said "You know, I *thought* there was something wrong with him!" What kind of bias is being demonstrated here? Explain your answer.

This is an example of "**hindsight bias**", where, when information is made available after a decision must be made, is the decision changed to match the information. The belief that there was something wrong with Bundy was made only after his true nature was known, in order to justify the decision that he was actually OK (but with misgivings).

Grade as 5=completely correct answer, 3=something is there but incomplete, and 0=completely wrong. Accept anything reasonable. If the student determines a different type of bias was in play here, and makes a carefully reasoned and reasonable argument supporting it, give full credit.

<6> 10 Points – Very Short Answers – An open but extremely biased political site holds a poll that gets badly Pharyngulated (swamped with votes counter to the bias of the site). What is wrong with each of the following attempts to prevent that from happening?

1. Using browser cookies to prevent each browser from voting more than once.

5 points: People can **clear their browser cookies** and vote again. Browser cookies do nothing to prevent one-browser-one-vote. Pharyngulation is still easy.

2. Requiring voters to be registered with the poll site as legitimate participants.

5 points: The only people likely to register with the poll site are those **people who already agree with the bias** of the site. People who disagree probably won't register. From the standpoint of the site owners this may not be a bad thing, but it definitely results in a skewed poll.

<7> 15 Points – Longer Answer – Consider an Ethernet wire with several computers on it. Machine A wants to send a message to machine Z, and Machine B wants to send a message to Machine X. Describe the process they go through in order to "talk", and describe what happens and how they react when the messages collide. You may use the back of the page for your answer.

Any machine wishing to send a message listens to the wire to see if anyone else is talking. If yes, it waits. If no, it starts talking. Everyone else can hear the message, but all but the destination machine ignore the message.

If machines A and B both wish to talk at the same time, they go through the same process of **both listening to the wire** to see if anyone else is talking. If yes, they wait.

If no, they both **start talking, but at the same time**.

Since **each machine is also listening to its own outgoing message**, both will detect the collision by determining that **what they are sending is not what they are hearing**. (That is, 0 bits are changed to 1s, and 1 bits are changed to 0s.)

When this happens, **both machines stop talking**, both **pick a random number indicating how long to wait**, and both will **start listening again after the wait time has expired**.

Since it is unlikely that the random numbers will be the same, one machine will start listening before the other one, decreasing the likelihood of another collision by the same pair of machines for the same messages.

Score as 2 points per boldfaced point – these are the highlights. Not everyone will express these seven core ideas the same way, so be flexible about scoring.