CMPSCI 120
# Fall 2017
Final Exam
Solution Key
Wednesday, December 20, 2017
Professor William T. Verts

<1> 15 Points – Answer any fifteen of the following questions. Answer more for extra credit. Correct answers will be scored as +1, incorrect answers as -1, and blank answers as 0.

STAR	Which network type has a large central computer and a bunch of terminals or smaller computers that talk to it?
TOKEN RING	Which network type passes a "magic cookie" around a loop of computers?
SWITCH	In Ethernet, what would I use to isolate two network sections, a hub or a switch?
FALSE	True or False: The Web is the "backbone" for the Internet (that is, the Internet sits up on top of the Web).
DNS	What turns **www.cs.umass.edu** into an IP address like **128.119.34.26**?
B	What class is the following (binary) IPv4 address? **10001001.10000001.00001010.00000101**
137.129.10.5	What is the IP address from the previous problem, when written in normal decimal (base 10) notation?
#191970	I want a color where red=25, green=25, and blue=112. What is the HTML code for this color?
MidnightBlue	What is the name for the color in the previous problem?
Finland	What does it mean when a URL ends in **.fi** ?
~verts	What is the username in the URL: **http://elsrv3.cs.umass.edu/~verts/cmpsci120/**
My%20Links.html	How do I specify the file named **My Links.html** in a URL?
³⁵⁵ ⁄ ₁₁₃	How can I encode the fraction $^{355}/_{113}$ into a Web page?
chmod 705 MyProgram.py	In UNIX, how do I set the permissions on **MyProgram.py** to: **rwx---r-x**?
chmod go-w MyData.cgi	In UNIX, how do I deny write permission to group and others for the file **MyData.cgi**?
mkdir MyPython	In UNIX, how do I create a folder called **MyPython** in the current folder.
directory or folder	When I list my files, I see that one has the code **drwxr-xr-x** on the left side of the listing. What does the leftmost **d** mean?
.BMP, .JPG, .PNG	What graphics file types are best for use on the Web that support full 24-bit color?
confirmation bias	What kind of bias occurs when you remember cases that match an assertion but forget all those cases that don't match?
Because OCT 31 = DEC 25	Why don't programmers know the difference between Halloween and Christmas?

<2>   10 Points – (1 Point each) Consider the following home networking arrangement:
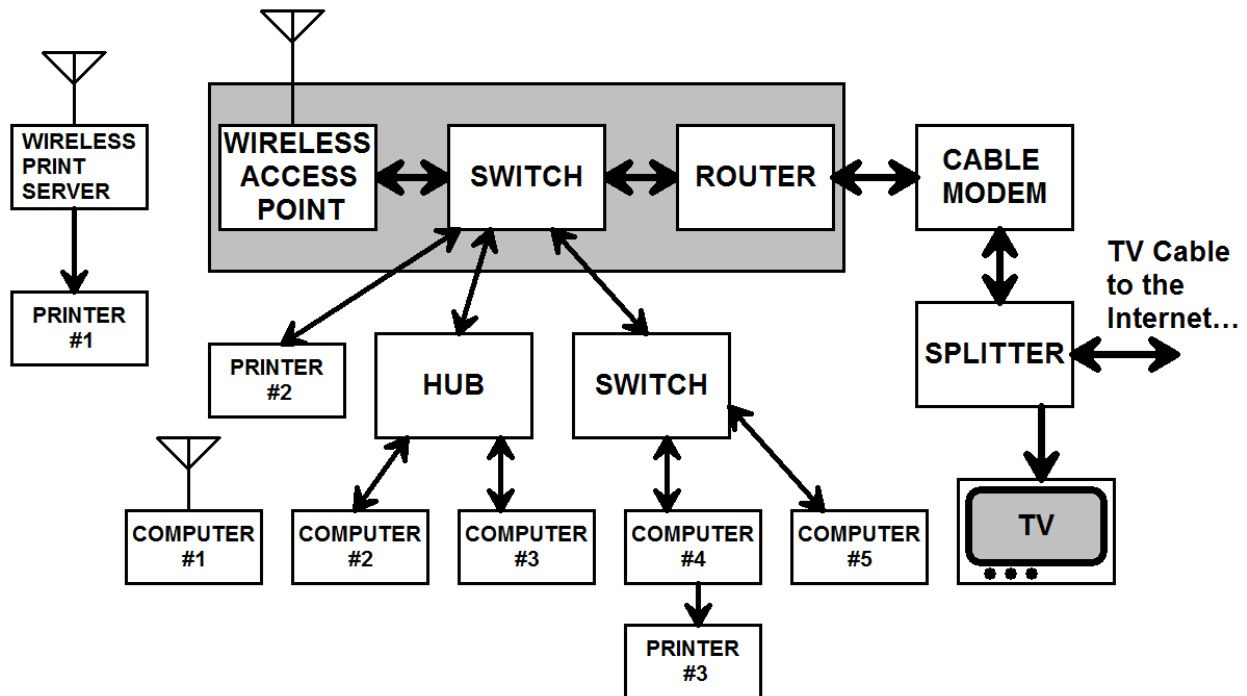
A.   If Computer #1 wants to send a message to Computer #2, which other local computers (if any) can hear that traffic?   **Computer #3**

B.   If Computer #1 wants to send a message to Computer #4, which other local computers (if any) can hear that traffic?   **Computer #5**

C.   If Computer #1 wants to send a message to the Internet, which other local computers (if any) can hear that traffic?   **None**

D.   If Computer #3 wants to send a message to the Computer #5, which other local computers (if any) can hear that traffic?   **Computer #2**

E.   If I replaced the hub with another switch, would any of the five computers be able to hear any of the Internet traffic of the other four?   **NO**

F.   How many distinct IP addresses are visible to the Internet? **One** (the Router)

G.   Can Computer #1 send a file directly to Printer #1, without involving the router?
                                                           NO

H.   For any local computer to use Printer #3, what must be true about Computer #4?
                                                 Must always be <u>ON</u>

I.   Can any of these computers, wired or wireless, print to Printer #2?
                                                           YES

J.   Is the upload speed <u>to</u> the Internet the same as the download speed <u>from</u> it?
                                                           NO

<3>   5 Points – When you type **emacs index.html** and get a blank screen unexpectedly, what is the most likely cause of the problem?

You are in the wrong folder.
(Typically happens when people first log on and don't change into the **public_html** folder first.)

<4>   5 Points – Short Answer – I receive an email from the "UMass IT division" that my password has been compromised, and I have to click on the link to log-in and fix it. Is this a good idea? Why or why not?

(2 points) No.
(3 points – Accept anything reasonable) This is likely a phishing attempt to get you to click on a link associated with malware. No legitimate site will send you a "click here dummy" link, but will instead ask that the recipient go to the appropriate Web site on their own and log in.

<5>   5 Points – Short Answer – What are the advantages of IPv6 over IPv4? Why has IPv6 taken so long to adopt?

(2 points) Many more available addresses (2^{128} rather than 2^{32})
(3 points – Accept anything reasonable) Replacing IPv4 with IPv6 requires replacing a lot of already existing and running hardware, which takes time and is expensive.

<6>   5 Points – Short Answer – Is the Request My Grades system that I wrote for my classes a *single-key* encryption system or a *double-key* (*public-key*) encryption system? Explain. What is the password?

(2 points) Single Key
(1 point) Dr. Bill has to communicate the password to students before they can use the system.
**(2 points) The password is 16 digits: the 8-digit SPIRE ID followed by the date of the request in YYYYMMDD format.**

<7>   5 Points – Short Answer – Describe the process of sending a private message to a person you do not know so only they can read the message and so they know it came only from you.

(2 points) First sender signs the message with the sender's private key,
(3 points) then sender encrypts the message with the recipient's public key,
        then the message is sent.

<8>   10 Points – (1 point each) The image shows the portion of the directory tree on **elsrv3** that contains your personal files for this course. In this question we will log in to our UNIX account through either PuTTY on Windows or `ssh` on a Mac and move around the directory tree. The ovals represent the names of directory folders. Indicate on the diagram with the letter of the question (B…K) the current folder *after* each UNIX task has been performed. Indicate if the command contains an error (the current folder will not change).
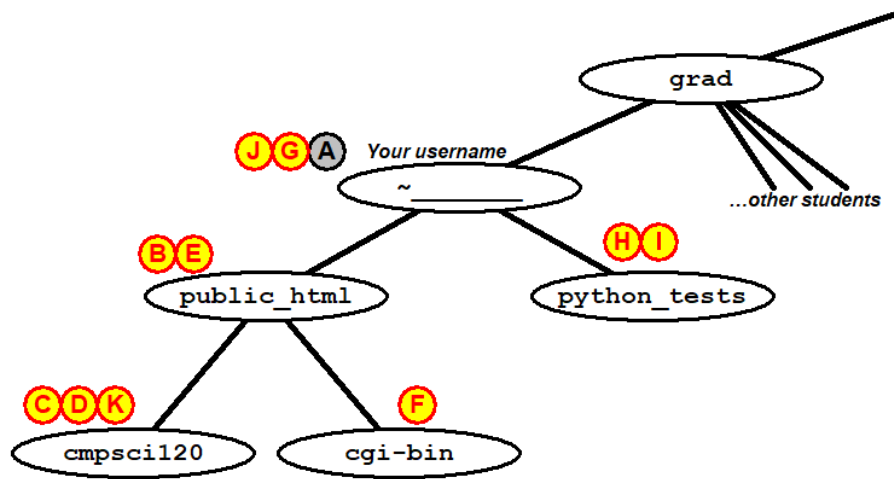
A: The current folder when I first log in (done for you).

B: After **cd public_html**

C: After **cd cmpsci120**

D: After **cd cgi-bin**   **ERROR** (**cgi-bin** not in **cmpsci120**)

E: After **cd ..**

F: After **cd cgi-bin**   (I forgot the **cd** on the exam but corrected in class)

G: After **cd ../..**

H: After **cd python_tests**

I: After **cd public_html**   **ERROR** (**public_html** not in **python_tests**)

J: After **cd ..**

K: After **cd public_html/cmpsci120**

<9> 15 Points – Finish the Web page below to include the following things, in the correct sections and in this order:

    1.   A link to an external style sheet called **CommonStyles.css** on my personal Web site at **http://www.cs.umass.edu/~verts**

    2.   An internal style block, setting the background color to **#00FFFF**.

    3.   A link to an external JavaScript file called **My Programs.js**

    4.   An **H1** heading saying **Welcome!**. The color of that heading must be <u>blue</u>, regardless of what any previous style settings might say.

    5.   A form named **MyForm**, containing only one button, labeled **Let's Go!**, that when clicked calls a JavaScript function called **Go();**

```
<HTML>
    <HEAD>
        <TITLE>My Web Page</TITLE>

        <LINK REL="stylesheet" TYPE="text/css"
         HREF="http://www.cs.umass.edu/~verts/CommonStyles.css">

        <STYLE TYPE="text/css">
            BODY {background-color:#00FFFF}
        </STYLE>

        <SCRIPT TYPE="text/javascript"
         SRC="My%20Programs.js"></SCRIPT>

    </HEAD>

    <BODY>
        <H1 STYLE="color:blue">Welcome!</H1>

        <FORM NAME="MyForm">
            <INPUT TYPE="button"
                   VALUE="Let's Go!"
                   ONCLICK="Go();">
        </FORM>

    </BODY>
</HTML>
```

Remove 1 point per error (-½ for minor syntax errors), but do not go below zero. Be consistent.

<10> 5 Points – Four lines are **written into the current document** by the following JavaScript code. Show what each resulting line will be when it is written into the document (not what will appear on the browser window).

```
<SCRIPT TYPE="text/javascript">
    <!--
        N = 1 ;
        while (N <= 4)
            {
            T = N * N ;
            document.writeln (N, "&sup2; = ", T, "<BR>") ;
            N = N + 1 ;
            }
    //-->
</SCRIPT>
```

LINE #1:   1² = 1
LINE #2:   2² = 4
LINE #3:   3² = 9
LINE #4:   4² = 16

1 Point per line, 1 point for general syntax errors. No credit for $1^2 = 1$, $2^2 = 4$, $3^2 = 9$, $4^2 = 16$; the answer <u>must</u> contain HTML.

<11> 5 Points – In my document there is a form named **MyForm**, which contains a text box named **OutputBox**. In the following function fill in the code to set the contents of that text box to the value of the polynomial **4N^2–2N+5**.

```
<SCRIPT TYPE="text/javascript">
    <!--
        function MyWeirdFunction (N)
        {
         document.MyForm.OutputBox.value = String(4*N*N-2*N+5) ;
        }
    //-->
</SCRIPT>
```

Give partial credit where appropriate, accept any program code that works. Assign points as follows:
2 points for **document.MyForm.OutputBox.value**
1 point for **String(____)**
2 points for **4*N*N-2*N+5** (-1 for using × instead of ***** or for using superscript powers)
Additionally, remove 1 point for other syntax errors, but do not go below zero.

<12>   10 Points – The following graphic image design, saved as **MyCart.gif**, shows several objects.   I want to make a client-side image map where both circles link to **www.wheels.com**, the rectangle links to **www.body.com**, and the background links to **www.cars.org**. Complete the HTML code to do this. Grid lines (which would not show up in the final image) in the image are 10 pixels apart.
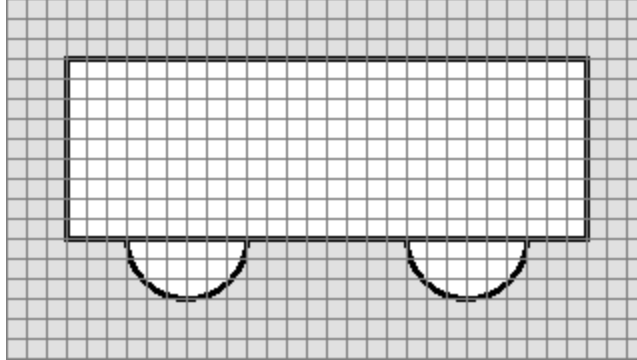

```
<IMG SRC="MyImageMyCart.gif" USEMAP="#MyMap">

<MAP NAME="MyMap">
    <AREA SHAPE="rect"                        (1 point)
          COORDS="30,30,290,120"              (1 point)
          HREF="http://www.body.com/">        (1 point)

    <AREA SHAPE="circle"                       (1 point)
          COORDS="90,120,30"                   (1 point)
          HREF="http://www.wheels.com/">       (1 point)

    <AREA SHAPE="circle"                       (1 point)
          COORDS="230,120,30"                  (1 point)
          HREF="http://www.wheels.com/">       (1 point)

    <AREA SHAPE="default"                      (1 point)
          HREF="http://www.cars.org/">         (1 point)
</MAP>
```

In the `MyImage` portion the text "MyImage" is struck through.

Start with 11 points, remove 1 point for each line in error (-½ partial credit as required). Remove 1 more point for shapes not rect-circle-circle-default. Do not go below zero.

<13>   5 Points – What is printed by the following Python program?

```
N = 1
while (N <= 4):
    T = N * N
    print N, "&sup2; = ", T, "<BR>"
    N = N + 1
```

This is the same as problem 10, has the same answer, and has the same scoring.