CMPSCI 120
Fall 2014
Final Exam
Friday, December 12, 2014
Professor William T. Verts
Solution Key

<1>   15 Points – Answer any fifteen of the following questions. Answer more for extra credit.

Point-to-Point	Which network type has every computer connected directly to every other computer with individual wires?
Token Ring	Which network type has computers connected in a circle, with data circulating around to determine which one "talks"?
Hub	What device connects a bunch of computers, but where every computer can "hear" the traffic of all others?
False	True or False: the Internet and the Web are the same thing.
False	True or False: DNS maps IP addresses into URLs.
32	How many bits are in an IPv4 address?
128	How many bits are in an IPv6 address?
Class B	In classful addressing, which class of addresses has 16,384 distinct networks with 65,536 addresses per network?
CIDR	What replaced classful addressing?
Finland	What does it mean when a URL ends in **.fi** ?
Spain	In Massachusetts it is 7:00pm and I want to download a large file. Should I get it from a Web mirror in Nevada or Spain?
™	How can I encode the trademark symbol **™** into a Web page?
%20	A filename contains a space (blank). How can I encode that space into a URL?
.PNG, .JPG	An image I want to put on the Web contains thousands of colors. Which graphics file type(s) support this?
.GIF, .PNG	Which graphics file types (**.BMP**, **.GIF**, **.JPG**, **.PNG**) support transparency?
No	Yes or No: Can a **.TXT** file contain a computer virus?
Cyan	Approximately what color is shown on screen for hexadecimal color **#19F4EA** ?
#ABC	What is the short hex representation of hexadecimal color **#AABBCC** ?
Yes	Yes or No: is the hexadecimal color **#FF6633** browser safe?
Confirmation Bias	Which type of bias it where people remember the events that match their preconceived ideas, but forget those that don't?
Infinity	In JavaScript, what is the result of calculating **N*N** when variable **N** has the value **1.0E300**?

<2>   10 Points – In this question we have logged in to our UNIX account through either PuTTY on Windows or ssh on a Mac. In the following sequence of tasks, write down the complete UNIX command needed to accomplish each task.

A.   Create the **public_html** folder.
            mkdir public_html

B.   Set the permissions on **public_html** to **rwxr-xr-x** (current values are unknown).
            chmod 755 public_html

C.   Set the permissions on **.** to **rwxr-xr-x** (they are currently set to **rwxr-x---**).
            chmod o+rx .

D.   Change into the **public_html** folder.
            cd public_html

E.   Create the **cgi-bin** folder inside **public_html**.
            mkdir cgi-bin

F.   Change into the **cgi-bin** folder.
            cd cgi-bin

G.   Create and edit the **MyScript.cgi** file.
            emacs MyScript.cgi

H.   Change the permissions on **MyScript.cgi** to **rwxr-xr-x**
            chmod 755 MyScript.cgi

I.   Change up one level, back to the **public_html** folder.
            cd ..

J.   Log off the UNIX computer.
            logout

<3>   5 Points – (Short Answer) Why is it a bad idea to telnet into Mordor? For those unfamiliar with "The Lord of the Rings", think of Mordor as a "very bad place full of dangers". The original line was "One does not simply walk into Mordor".

Because Sauron (or the other bad guys) will get your password with his packet sniffer!

<4>   15 Points – In the **STYLE** block below, define both **H1** and **H2** headings to be <u>centered</u> and in the <u>Courier typeface</u>, and <u>blue</u>, all paragraphs to be <u>fully justified</u>, and the background color of the page to be <u>yellow</u>. Complete the JavaScript function **Thingie** to return the parameter N times 5 plus 1. In the body put an **H2** heading saying **Cool!** Next, insert <u>in-line</u> JavaScript that writes into the document the result of calling the **Thingie** function on the value 10. In the **FORM** block put in <u>two text boxes</u> named **Stuff** and **Nonsense**, and a <u>submit</u> button that sends all of the form data to a script called **handler.cgi** in the **cgi-bin** folder of account **bob** on our class server.

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

        <STYLE TYPE=_____>

            H1,H2 {text-align:center ;
                   color:blue ;
                   font-family:'Courier'}

            P {text-align:justify}

            BODY {background-color:yellow}

        </STYLE>

        <SCRIPT TYPE="text/javascript">
            <!--
                function Thingie (N)
                    {
                    return N * 5 + 1 ;
                    }
            //-->
        </SCRIPT>
    </HEAD>

    <BODY>
        <H2>Cool!</H2>

        <SCRIPT TYPE="text/javascript">
            <!--
                document.writeln(Thingie(10)) ;
            //-->
        </SCRIPT>

        <FORM METHOD="POST"
          ACTION="http://elsrv3.cs.umass.edu/~bob/cgi-bin/handler.cgi">
            <INPUT TYPE="text" NAME="Stuff">
            <INPUT TYPE="text" NAME="Nonsense">
            <INPUT TYPE="submit">
        </FORM>
    </BODY>
</HTML>
```

<5> 5 Points – (Short Answer) In the HTML document on the previous page (question 4) can we tell whether the CGI script is written in Python, Perl, or some other scripting language? Why or why not? Where is that script located?

No, we can't tell what language the script is written in because the file extension (`.cgi`) just means that it is some kind of Common Gateway Interface script. The first line of that script will determine the language. The script is located in Bob's `cgi-bin` folder on our class server.

<6> 5 Points – Typeset the equation $A_i = \frac{1}{2}(B_i + 1)^3$ into HTML (notice that the subscripts are in italics):

```
A<SUB><I>i</I></SUB> = &frac12;(B<SUB><I>i</I></SUB> + 1)<SUP>3</SUP>
```

<7> 10 Points – Write an HTML fragment to create a table that appears on screen as follows:

Frog	Toad	Dog
Newt		

```
<TABLE BORDER>
    <TR>
        <TD>Frog</TD>
        <TD>Toad</TD>
        <TD ROWSPAN="2">Dog</TD>
    </TR>
    <TR>
        <TD COLSPAN="2">Newt</TD>
    </TR>
</TABLE>
```

<8>   5 Points – An HTML document links to an external style sheet file that contains the single definition **H1 {color:red ; text-align:center}**, and the **<STYLE>** block in that same document also contains the single definition **H1 {color:green}**.

    A.   What is the color of **H1** headings in this document?
             green

    B.   What is the color of **H2** headings in this document?
             black

    C.   Are **H1** headings in this document centered or left justified?
             centered

    D.   Are **H2** headings in this document centered or left justified?
             left-justified

    E.   How do I write the code to turn a <u>particular</u> **H1** heading **blue**?
             <H1 STYLE="color:blue">

<9>   5 Points – The following graphic image, saved as **MyMap.gif**, shows two objects, a circle and a rectangle. I want to make a client-side image map where <u>both</u> the circle and the rectangle link to **www.frog.org**, and where the default background links to the **animals.gif** image file on **elsrv3.cs.umass.edu/~verts**. Complete the HTML code to do this. Grid lines in the image are 10 pixels apart.
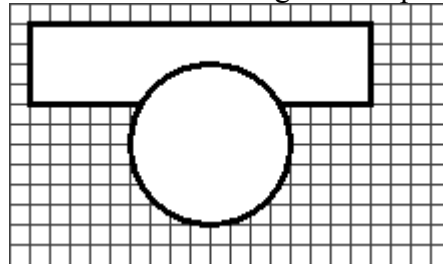

```
<IMG SRC="MyMap.gif" USEMAP="#MyMap">

<MAP NAME="MyMap">

    <AREA SHAPE="rect" COORDS="10,10,180,50"
        HREF="http://www.frog.org/">

    <AREA SHAPE="circle" COORDS="100,70,40"
        HREF="http://www.frog.org/">

    <AREA SHAPE="default"
        HREF="http://elsrv3.cs.umass.edu/~verts/animals.gif">

</MAP>
```

<10> 10 Points – What is ***written into the current document*** by the following JavaScript code?

```
document.writeln ("<H1>Answers</H1>") ;
Frog = 1 ;
Total = 0 ;
while (Frog <= 4)
      {
      Total = Total + (Frog * Frog) ;
      document.writeln (Frog, " = ", Total, "<BR>") ;
      Frog = Frog + 1 ;
      }
```

<H1>Answers</H1>
1 = 1
2 = 5
3 = 14
4 = 30

<11> 10 Points – Translate/convert the JavaScript code from the previous problem into an equivalent program in Python. Be careful of your indentation and capitalization! The first three lines are given for you.

```
#!/usr/bin/python
print "<H1>Answers</H1>"
Frog = 1
Total = 0
while (Frog <= 4):
     Total = Total + (Frog * Frog)
     print Frog, " = ", Total, "<BR>"
     Frog = Frog + 1
```

<12> 5 Points – Write a <u>short</u> essay (no more than 5-6 sentences) on **one** of the following topics (5 points extra credit for doing <u>two</u> topics, but no extra credit for more than two):
- Describe the *cascade* in CSS and how it works.
- Describe how public key encryption works.
- Describe why the phrase "please change my PuTTY password" is wrong.
- Describe why spam is so prevalent.
- Describe the advantages and disadvantages of `.SVG` files relative to `.BMP`, `.GIF`, `.JPG`, and `.PNG` files.

The cascade describes how attributes of HTML tags get their values. Values may be established for a group of HTML documents by external `.css` files, for the current document by a `<STYLE>`...`</STYLE>` block, within a tag by a `STYLE=""` attribute, or by default. Any `.css` files override the defaults, the `<STYLE>` block overrides the `.css` files, and `STYLE` attributes override everything.

In public-key encryption, a key-pair is computed such that a message encrypted with one half can only be decrypted by the other half. One half is made public; the other is kept private. To send a message to someone, a message is encrypted with their public key. The encrypted message can be sent over an insecure channel. Only the intended recipient can decode the message with their private key. A message encrypted with the sender's private key can be decrypted by everyone with the sender's public key; thus the sender has signed the message.

PuTTY is a program for connecting to remote computers. It has no concept of a password, but merely passes information back and forth between the local and the remote computers. The password is for the remote (UNIX) computer. People who talk about a PuTTY password are confusing the program for connecting to a remote computer with the remote computer itself.

It is trivially easy to write a program (like our Factorial project) which can send an email under program control – give that program a file of addresses and it can send a message to all of them in a very small amount of code. The cost of doing so is essentially zero.

SVG files are text files that contain descriptions of geometric objects. These objects are mathematically scalable to any size. SVG files thus can be displayed at any size but do not suffer from aliasing (the "jaggies") as do all pixel-based formats. On the other hand, all the pixel-based formats can contain arbitrary images that differ on a pixel-by-pixel basis.