CMPSCI 105 Midterm Exam Solution
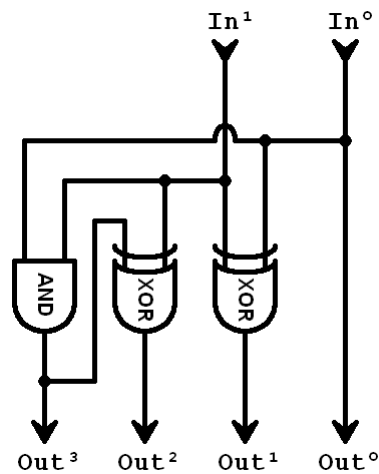# Spring 2008
March 27, 2008
Professor William T. Verts

GENERAL KNOWLEDGE

<1>   13 Points – Fill in your answer into the box at the left side of each question. Show your work on the back of a page if you want us to consider partial credit.

FALSE	True or False: A 3½-inch diskette is a "hard disk". The disk material is "floppy" even though it is inside a hard shell.
FALSE	True or False: A USB flash drive is a "hard disk". It logically *acts* like a hard disk, but there is no spinning disk inside.
TRUE	True or False: Integers can be represented in a finite number of computer memory bits with their true values, not approximations. The number of bits available determines the storable range of integers.
FALSE	True or False: The binary value of the number pi (π) can be represented in a finite number of memory bits as its true value, not an approximation. Pi is irrational and goes on forever (in any base).
FALSE	True or False: With three hexadecimal digits you can represent all decimal values between 0 and 255, but no other values. Two digits are enough for 0…255, three digits will allow 0…4095.
T	What is the symbol (digit or letter) we would use for the largest single digit value in base 30? 30 digits = 0123456789ABCDEFGHIJKLMNOPQRST
123	Convert the binary (base 2) number 11110011_2 into decimal (base 10). $1\times2^6 +1\times2^5 +1\times2^4 +1\times2^3 +0\times2^2 +1\times2^1 +1\times2^0 = 64+32+16+8+0+2+1 = 123$
7B	Convert the binary (base 2) number 11110011_2 into hexadecimal (base 16) using the bit-partitioning method. $0111_2 = 7_{16}$, $1011_2 = 11_{10} = B_{16}$
173	Convert the binary (base 2) number 11110011_2 into octal (base 8) using the bit-partitioning method. $001_2 = 1_8$, $111_2 = 7_8$, $011_2 = 3_8$
11001101	What is the sum in binary (base 2) of the two binary numbers 11110011_2 and 1010010_2?
12021	Convert the decimal (base 10) number 142_{10} into base 3. $1\times3^4 + 2\times3^3 + 0\times3^2 + 2\times3^1 + 1\times3^0 = 81 + 54 + 0 + 6 + 1 = 142_{10}$
128	How many rows would be in the truth table for an AND-gate with 7 inputs? $2^7 = 128$
1	In the previous problem, how many of those outputs will be 1 (TRUE)? The result of AND is 1 only if all inputs are 1; only one row does this.

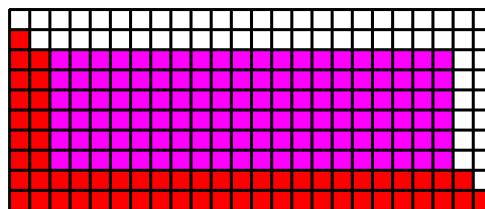<2>   8 Points – Trace the following gate circuit and show its output for all combinations of input values.

In		Out			
1	0	3	2	1	0
0	0	0	0	0	0
0	1	0	0	1	1
1	0	0	1	1	0
1	1	1	0	0	1

It isn't part of the question, but this circuit performs a useful function. After converting the two input bits into a single decimal number and converting the four output bits into a single decimal number, we find that the output value is exactly three times the input value. This is a multiply-by-three circuit.

<3>   5 Points – What was the "magic number" on the class Web site that I asked you to bring to the exam (3 points)? What is the base-2 logarithm of that number (2 points)?

65536 was the number, and $\log_2(65536) = 16$ (because $2^{16} = 65536$).

<4>   3 Points – I want to design a 3D sculptured button for my Web page in Windows Paint. The following grid shows all of the individual pixels of my button, as if zoomed to 800% in Paint and with Show Grid turned on. The body of the button will be *gray*, and there will be a *2-pixel thick border* around the outside edge of the button which simulates a bright *light source <u>above</u> and to the <u>right</u>* of the button, making it appear to *stick out* of the screen towards you (most buttons have the light source above and to the left, but we are being slightly different today). Indicate on the image below how to fill in the pixels of the button; use ✗ to indicate gray pixels (or shade them in very lightly), completely fill in black pixels as ■ with dark shading, and leave white pixels empty. Every pixel in the grid shown here (whether white, gray, or black) will form some part of our button.

The white (bright) pixels will be the top two rows and rightmost two columns of the grid, and the dark (shadowed) pixels will be the bottom two rows and leftmost two columns.

The middle pixels are the lightly shaded (gray) pixels. We are not going to be picky about getting the bevel perfect at the upper left and lower right corners.

UNIX & THE INTERNET

<5>   8 Points – I want the **BGCOLOR** of my Web page to have its red value set to 13, the green value set to 250, and the blue value set to 245. Fill in the slots below with the six-digit hexadecimal HTML code that I would use to describe this color (one hex digit per slot).

$$\texttt{<BODY BGCOLOR="\#} \quad \underline{0} \quad \underline{D} \quad \underline{F} \quad \underline{A} \quad \underline{F} \quad \underline{5} \quad \texttt{">}$$

Red $= 13_{10} = \mathbf{0D}_{16}$ → $\mathbf{0} \times 16^1 + \mathbf{D} \times 16^0 = 0 \times 16 + 13 \times 1 = 0 + 13 = 13_{10}$

Green $= 250_{10} = \mathbf{FA}_{16}$ → $\mathbf{F} \times 16^1 + \mathbf{A} \times 16^0 = 15 \times 16 + 10 \times 1 = 240 + 10 = 250_{10}$

Blue $= 245_{10} = \mathbf{F5}_{16}$ → $\mathbf{F} \times 16^1 + \mathbf{5} \times 16^0 = 15 \times 16 + 5 \times 1 = 240 + 5 = 245_{10}$

What is the approximate color that will appear on screen? (2 points)

Low Red + High Green + High Blue = Cyan (or Aqua, Turquoise, Teal, Blue-Green)

<6>   2 Points – Short Answer – How is PuTTY different from traditional telnet programs?

PuTTY *is* a telnet program, but it ***encrypts*** its communications so that packet-sniffers cannot extract vital data (credit card numbers, passwords, etc.).

<7>   6 Points – The octal permissions on some UNIX file are currently **367**.

1.   (2 points) Written as a combination of **r**, **w**, **x**, and **-** characters, what is the current permission pattern on this file?

-wxrw-rwx   ($3=011_2=\mathbf{-wx}$, $6=110_2=\mathbf{rw-}$, $7=111_2=\mathbf{rwx}$)

2.   (4 points) What symbolic codes would I use in the **chmod** command to change the permissions to **rw-r--r--** such that only the minimum number of bits that need to be changed are changed (that is, you don't add a particular permission to a section that already has it, and you don't remove a permission that isn't present).

Lay the current permissions above the desired permissions to see what is different:

-wxrw-rwx
rw-r--r--

The differences are what need to be encoded into the chmod command (and there are a couple of legal ways to do this).

chmod u+r,u-x,g-w,o-wx *filename*   *-or-*

chmod u+r,uo-x,go-w *filename*

<8>   6 Points – Write a code *fragment* (not a complete Web page) that is a <u>link</u> to CNN's Web site, where in order to follow the link you must click on an <u>image</u> named **News.jpg** and where the image is <u>centered</u> in the browser window. Use only the minimum amount of HTML necessary to do the job; points will be removed for any unnecessary code.

```
<A HREF="http://www.cnn.com">
    <CENTER>
        <IMG SRC="News.jpg">
    </CENTER>
</A>


    -or-


<CENTER>
    <A HREF="http://www.cnn.com">
        <IMG SRC="News.jpg">
    </A>
</CENTER>
```

<9>   4 Points – Find and correct the errors in the existing HTML code below. Do not add any new code; simply fix the errors in what you see here.

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

    <BODY BGCOLOR="Green">
        <H1>Welcome to my Web Page</H21><BR>
        <IMG SCRSRC="Frog.gif">
    </BODY>
</HTML>
```

Note that the welcome message can be corrected to either **<H1>…</H1>** or to **<H2>…</H2>**
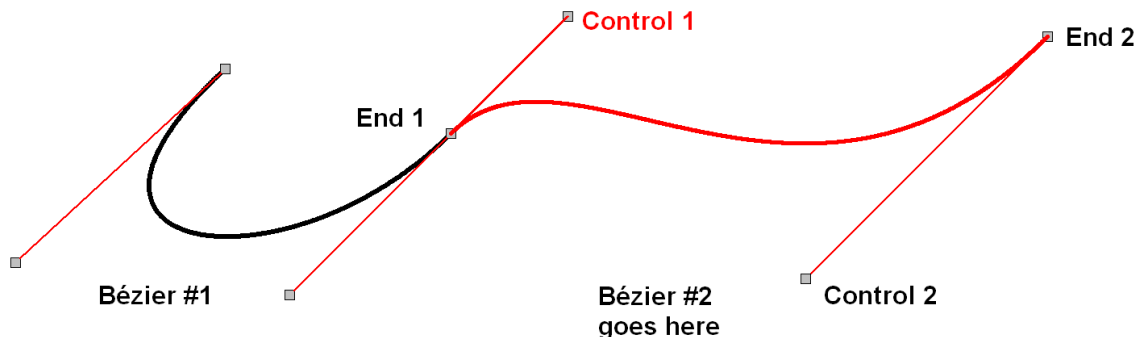
MICROSOFT WINDOWS & ACCESSORIES

<10>   3 Points – Short Answer – The default behavior for Microsoft Windows is to hide the file extensions for files of known type (for example, the name of the file **Frog.gif** would appear on screen as simply **Frog**). Why is it a good idea for us to turn <u>on</u> the display of file extensions? (I.e., under what circumstances would seeing the file extension give us more information than we get just by looking at the file's name and/or icon?)

1.   In specifying the name of a graphics file for a Web page we need to know if the extension is **.jpg** or **.jpeg** (the same icon is used in both cases). Showing file extensions will allow us to get the name right in the HTML source text.

2.   Trojans may use extensions to fool you into running a program when you think you are loading in a data file. For example, without file extensions shown the malicious program **music.mp3.exe** would appear as simply **music.mp3**, leading you to think it was a music file and not a program file.

<11>   5 Points – Short Answer – Two copies of Windows Notepad are running, both containing text. Describe completely how to ***move*** (not copy) a block of text from one to the other.

1.   Select the proper section of text in the copy of Notepad containing the source.
2.   Edit-Cut
3.   Select the copy of Notepad to receive the text.
4.   Click on the proper insertion point.
5.   Edit-Paste

<12>   3 Points – The following diagram shows Bézier curve #1 as I might draw it in Windows Paint, along with its endpoints and control points. Draw Bézier curve #2 so that it blends smoothly into Bézier curve #1. The endpoints and one of the control points for Bézier #2 are given to you; as part of your answer you will need to indicate on your drawing where to place Control 1 (any legal placement for Control 1 is OK).

Control point #1 can be anywhere along the line between End 1 and the corresponding control point from Bézier #1. The drawn curve must be tangent to both control lines at the end points.

WORD PROCESSING

<13>   2 Points – In the <u>document header</u> of this page of the exam point out examples of *serifs*.

The document header is the line at the top of each page that says:

CMPSCI 105 Midterm Exam – Spring 2008 – Professor William T. Verts

Pointing out any of the little spikes on any of the letters would suffice.

<14>   3 Points – Write down an English word containing at least five letters that contains <u>two</u> letter-pairs where *kerning* can occur, and indicate <u>which</u> letter-pairs can be kerned. You are not allowed to use any of the words from the book in the section on kerning.

Any legal word with two identified kern points is acceptable. One example is the word V<u>A</u>C<u>AT</u>ION, which allows kerning between the V-A pair and between the A-T pair.

<15>   2 Points – Each line of text in a poster measures one full inch from the ascender line to the descender line. What is the *point size* of the font being used?

72 points (one point is 1/72 of an inch)

<16>   3 Points – Short Answer – In Microsoft Word I change the definition of one of the *styles* (font, indents, spacing, etc.). What happens in my document as a result of that change?

All paragraphs which use those named styles automatically update to reflect the new appearance.

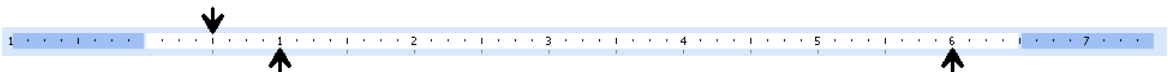<17>   4 Points – Short Answer – Why would I save a word processing document as a `.PDF` (Adobe Acrobat format) file?

To publish the file for people who do not use the same word processor that you do. Also, with security on the `.PDF` file you can make material available publicly without worrying about people copying or stealing your intellectual property.

<18>   4 Points – Examine the ruler line below:

1.   What are the values in inches of the left and right margins?

1 inch each.

2.   Mark on the ruler the positions of the left indent, first line indent, and right indent buttons for paragraphs that are indented ½ inch from each margin and <u>also</u> have a *hanging indent* of ½ inch.

SPREADSHEETS

<19> 5 Points – Cell **U10** contains the following formula which is then copied to cell **AC15**. What is the resulting formula in cell **AC15** after the copy has been completed?

=X8*(15+$B$10)*M15+Z$25

=AF13*(15+$B$10)*U20+AH$25

All relative cell addresses (underlined) are shifted to the right by 8 columns and down by 5 rows, which is the distance between **U10** and **AC15**.

<20> 5 Points – Parenthesize the following expression to show how it will be computed in Excel. Put in as many parentheses as possible to completely show when each operator is evaluated:

=(((9 – ((5 * 7) * 3)) + 8) – (2 * 4))

<21> 6 Points – Here is a spreadsheet containing numeric data:

	A	B	C	D	E	F
1						
2		34	62	76	62	
3		54	33	43	21	
4		82	92	22	74	
5		57	23	5	49	
6						

1.   What is the value of the formula **=MIN(C3:E4)** ?

   21. The range **C3:E4** refers only to those six cells which contain the numbers 33, 43, 21, 92, 22, 74.

2.   Write a single, efficient formula for cell **F2** that adds up all the numbers currently visible in its row. This formula must be written so that it can be drag-copied to cells **F3**, **F4**, and **F5** and perform the correct computations for each row.

   =SUM(B2:E2)   *(all relative addresses)*

3.   Write a single, efficient formula to *add up* all visible cells that contain numbers except for those in cells **B2:C3**.

   =SUM(B4:E5,D2:E3)   *-or-*
   =SUM(D2:E5,B4:C5)   *-or-*
   =SUM(D2:E3,B4:C5,D4:E5)   *(less desirable)*