CMPSCI 105 Midterm Exam Solution
Fall 2006
October 27, 2006
Professor William T. Verts

GENERAL KNOWLEDGE

<1>   7 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".
FALSE	True or False: A USB flash drive is a "hard disk".
107	Convert the binary (base 2) number 1101011_2 into decimal (base 10). $1{\times}2^6 + 1{\times}2^5 + 0{\times}2^4 + 1{\times}2^3 + 0{\times}2^2 + 1{\times}2^1 + 1{\times}2^0 = 64{+}32{+}0{+}8{+}0{+}2{+}1$
153	Convert the binary (base 2) number 1101011_2 into octal (base 8) using the bit-partitioning method. (leading zeroes needed) 001-101-011 $\rightarrow$ 1-5-3
11101001	What is the sum in binary (base 2) of the two binary numbers 1101011_2 and 1111110_2?
734	Convert the base 20 number $1GE_{20}$ into decimal (base 10). $1{\times}20^2 + G{\times}20^1 + E{\times}20^0 = 1{\times}400 + 16{\times}20 + 14{\times}1 = 400 + 320 + 14$
40,960	How many bits are there in 5 kilobytes? 5 kilobytes $\times$ 1024 bytes per kilobyte $\times$ 8 bits per byte = $5{\times}1024{\times}8$ bits

<2>   2 Points – Short Answer – What is the difference between "telnet" and "PuTTY"?

Both are "telnet" programs that allow for communication with remote computers for the purpose of issuing commands to those computers. PuTTY is a program (written by Simon Tatham of the U.K.) which is an **encrypted** telnet. Packet sniffers intercepting the communications cannot decode the packets as they would be able to do with traditional telnet programs.

<3>   4 Points – I use the HTML color **"#E21F2E"** in my Web page. What are the decimal (base 10) values of the red, green, and blue components of this color? Show where this color is located (approximately) in the following color cube:
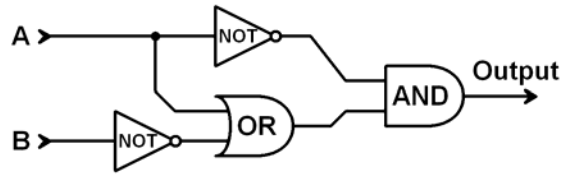
Red   = **E2** = $E{\times}16^1 + 2{\times}16^0 = 14{\times}16 + 2{\times}1 = 224 + 2 =$ **226**

Green = **1F** = $1{\times}16^1 + F{\times}16^0 = 1{\times}16 + 15{\times}1 = 16 + 15 =$ **31**

Blue   = **2E** = $2{\times}16^1 + E{\times}16^0 = 2{\times}16 + 14{\times}1 = 32 + 14 =$ **46**
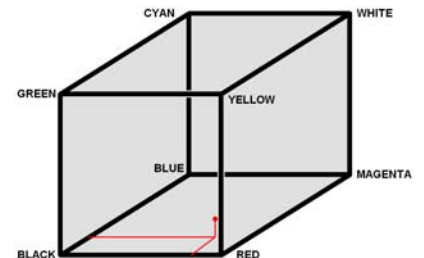
<4>   8 Points – Trace the following gate circuit and show its output for all combinations of input values. EXTRA CREDIT: +5 points if you can draw an equivalent gate circuit which is simpler (i.e., accomplishes the same task using fewer gates).

A	B	Output
0	0	1
0	1	0
1	0	0
1	1	0

Extra Credit Solution:

UNIX & THE INTERNET

<5>   6 Points – Write a fragment of HTML (not a complete Web page) that links to the site **www.cnn.com** whenever I click on an image stored in the **news.jpg** file (stored in the same directory folder as the Web page containing the link).

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

<6>   6 Points – The UNIX directory **mystuff** currently has permissions **r---w---x**, but I want the permissions to be **rwxr-xr-x** instead. Fill in the blanks below to cause the appropriate changes in both the <u>symbolic</u> and <u>absolute</u> forms of the **chmod** command:

1.   (Symbolic)   **chmod u+wx,g+rx,g-w,o+r mystuff**
      -or-   **chmod a+rx,u+w,g-w mystuff**

2.   (Absolute)   **chmod 755 mystuff**

<7>   3 Points – Short Answer – What does "anonymous ftp" mean?

Anonymous ftp means that you *do not have an account* at a remote ftp site. By logging in as anonymous you are informing the remote site that you are a guest, and to give you *limited privileges*.

<8>   3 Points – Short Answer – It is noon here in Massachusetts, and I want to download a big video file of my favorite TV show, but I'm too impatient (or stupid) to wait until network traffic dies down. Should I download that file from a mirror in Illinois, from a mirror in Great Britain, or does it really matter considering that all three places will have heavy Net traffic right now? Are there other factors than traffic that affect my decision?

All other factors being the same (i.e., traffic) the preferred download site is Illinois. The distance is shorter than to Great Britain, so there will tend to be fewer "hops" from computer to computer, the overall response time will be shorter (due to speed-of-light lags), and there will not be an overseas hop (requiring a link through a satellite or undersea cable).

<9>   2 Points – Short Answer – I create a graphic of a sculptured button in Windows Paint, which has both text and a small image containing only about 200 colors (as shown). In order to use this button on the Web, should I save the graphic as a `.BMP`, `.GIF`, or as a `.JPG` file? Why?

You cannot normally use a `.BMP` file in a Web page. Both `.GIF` and `.JPG` will work in Web applications, but `.JPG` uses *lossy* compression and will distort the sharp color changes around the button edges and text edges. Since it is stated that the picture contains fewer than 256 colors (the limit for `.GIF`, which uses *lossless* compression), the preferred file format is **`.GIF`** in this case.

<10>   5 Points – Short Answer – I have a Web page file on the remote computer containing my UNIX account, and I need to make changes to that file. I could either (1) use ftp to copy the file from the UNIX machine to my Windows PC, edit it in Notepad, and then ftp the file back, or (2) telnet to the UNIX machine and edit the file directly with emacs. What are the advantages and disadvantages of each approach?

1.	Advantages:	Nobody sees the changes until the edits are correct, and you get to use Notepad which is easy to use.
	Disadvantages:	Complicated process of copying-editing-copying, and there are two versions of the page to manage.
2.	Advantages:	Only one version to deal with, edits are seen immediately on the Web.
	Disadvantages:	Mistakes in editing are also seen immediately, and it requires that you learn to use a separate text

editor (emacs).

MICROSOFT WINDOWS & ACCESSORIES

<11>   3 Points – In Notepad, what does it mean when the <u>E</u>dit-<u>C</u>opy menu entry is gray?

It means that *no text has been selected*. (It has nothing to do with the current contents of the clipboard.)

<12>   2 Points – I have two folders open on screen from the <u>same</u> disk drive. If I <u>left</u>-click-drag a file from one to the other, will the file be <u>moved</u> or <u>copied</u> into the destination folder?

Moved. Only if the folders are on different drives will the file be copied. This is why I prefer to use a right-click-drag instead; doing so pops up a menu asking which behavior I prefer (move, copy, or create shortcut).

<13>   2 Points – Yes or No: If I install a link to Windows Notepad in the Send To menu, can I send <u>any</u> file to Notepad, including **.EXE** files (as opposed to sending just **.TXT** files)?

Yes. It doesn't mean that you can correctly edit the garbage that will appear in Notepad if you send it a binary file such as a .EXE, but it *will* work.

<14>   5 Points – The following diagram shows the endpoints, control points, and control lines for a Bézier curve. Draw the curve (the way that Windows Paint would draw it).
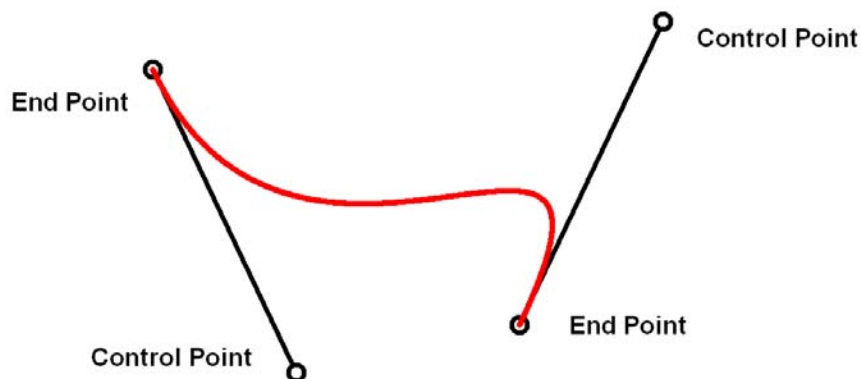
Note that the curve is *tangent* to the control lines at each of the end points, and that the curve falls entirely inside the *convex hull* of the four points (the smallest polygon that surrounds all four points).

WORD PROCESSING

<15> 3 Points – In the picture shown here:

A. Point out all places where **kerning** can be used to reduce unnatural-looking white space.

Between the T and A, and between the A and Y in the word STAY. No other pairs are kernable.

B. Does the typeface in the sign have **serifs**, or is it **sans-serif**?

Sans-serif.

C. In the sign each word is about two inches high. What is the height in **points** of that text?

Two inches at 72 points per inch is **144 points**.

<16> 3 Points – Short Answer – What is a **style** in Microsoft Word (as part of the **style sheet** stored in **NORMAL.DOT**)?

A style is a named paragraph format description, containing information about indentation, line spacing, justification, fonts, etc. Examples are Normal and Heading 1 in the standard style sheet. Note that this is *not* the definition of style as applied to typefaces (i.e., outline, italic, etc.).

<17> 3 Points – I need to reduce a <u>five</u> page term paper to make it fit into <u>four</u> pages without deleting any text. List ***three methods*** for doing this.

1. Decrease point size of font.

2. Decrease widths of margins.

3. Decrease line spacing.

4. Select narrower typeface.

5. Decrease inter-character spacing.

<18>   5 Points – Short Answer – I use Microsoft Word on all my documents, and I want to put some of my work on the Web. I want people to be able to read and print it, but <u>not</u> be able to extract the text, put their name on it, and re-release it as if it was their own work. How do I make my work public without endangering my intellectual property?

If Adobe Acrobat is installed, save the Word document as a `.PDF` file. Afterwards, load the `.PDF` file into Acrobat and set the security levels (with a password) to deny extraction of text from the document. You may also restrict the ability to print the document at this time, if desired. The secure `.PDF` now may be put onto the Web.

SPREADSHEETS

<19>   5 Points – Cell **S12** contains the following formula which is then copied to cell **W17**. What is the resulting formula in cell **W17** after the copy has been completed?

=V6-$B9*15+X10*$F$5-P14

The formula is being copied right by four columns and down by five rows. Each relative cell address (V6, the 9 in $B9, X10, and P14) is modified by the same amount. The 15 is a numeric constant and does not change, and the $F$5 is an absolute address which also does not change.

<div style="color:red">

V6	→	Z11
$B9	→	$B14
X10	→	AB15
P14	→	T19

</div>

The final formula is thus:

=Z11-$B14*15+AB15*$F$5-T19

<20>   10 Points – Here is a portion of a spreadsheet containing some numbers.

	A	B	C	D	E	F	G
1							
2		4	2	5	1	3	
3		7	0	3	4	2	
4		3	5	8			
5		6	8	9			
6							

1.   What is the result of evaluating the formula **=SUM(B2:B5)** ?

20

2.   What is the result of evaluating the formula **=MAX(B2:F3)** ?

7 (the range covers just the top two rows of numbers; if anyone answered 8 or 9 it shows that they do not understand how ranges are defined).

3.   Write a single, <u>efficient</u> formula using a single **SUM** function which adds up all cells containing numbers, but does <u>not</u> include any empty cells.

> **=SUM(B2:F3,B4:D5)**   *-or-*
> **=SUM(B2:D5,E2:F3)**   *-or-*
> **=SUM(B2:D3,E2:F3,B4:D5)**   *{Not a preferred form}*

4.   Write a single, <u>efficient</u> formula to go into cell **B6** which computes the average of the numbers in that column only. Structure your formula so that it can be copied into columns **C** and **D** and have it compute the appropriate averages.

> **=AVERAGE(B2:B5)**

5.   Write a single, <u>efficient</u> formula to go into cell **G2** which computes the sum of the numbers in that row only. Structure your formula so that it always returns the same value (the sum of row **2**) <u>no matter where it is copied</u>.

> **=SUM($B$2:$F$2)**

<21> 2 Points – Cell **A1** contains the formula **=3*25-15*5**. What is the result of the following formula?

> **=IF(A1=0,"Yes","No")**

The result of computing the formula in A1 is zero. The condition in the **IF** is therefore true, so the **IF** function returns the string **"Yes"**. If someone evaluated the expression from left-to-right instead of by normal arithmetic precedence rules they'll get 300, which is the wrong answer and would generate the wrong result from the **IF** function.

<22> 6 Points – The formula **=NOW()** returns the internal date number 39017 for today, October 27, 2006. For the formula **=NOW()+10** what is the internal date number that is computed and what is the calendar date shown on screen?

The internal date number is 39017 + 10 = **39027**.

The calendar date is October 27 + 10 = **November 6**
(Remember that October has 31 days. Happy Halloween!)

<23> 5 Points – The image to the left shows the setup for sorting the selected block of numbers. Write down in the image to the right the result of the sort step (i.e., show the arrangement of the numbers in cells **A1:B5**).
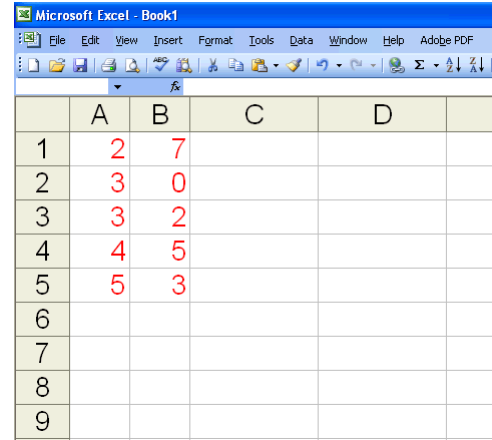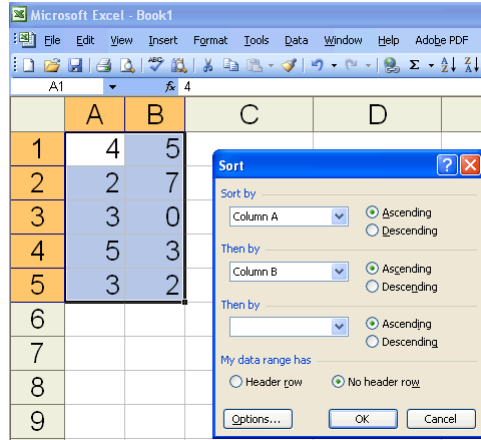
A lot of students got this problem wrong, even though we covered it in the "Bat Poop" lecture. When you select a block of numbers to sort in a spreadsheet, the spreadsheet treats each row as an indivisible unit; much like a database treats its records. What this means is that no matter how things are sorted, the row containing the 4 in column A will always contain the 5 in column B. Sorting column A in ascending order arranges column A as 2 3 3 4 5. The only time the "Then By" for column B comes into play is on the two records with 3s in column A; the record containing 3-0 comes before the record containing 3-2.