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EECS 1520.03 COMPUTER USE: Fundamentals

Test 1 (**Solutions**)
February 11, 2015

Instructions:

- This is an in class examination, therefore examination rules are in effect.
- Fill in the box at the top of this page, and print your Student ID# at the top of each other page.
- Answer ALL questions:
- Time allowed is **60** minutes.
- Use of calculators is **NOT** permitted.
- There are **8** pages including this cover. Please count them.

Part	Value	Mark
A	**15**	_____
B	**35**	_____
Total:	**50**	

Part A [15 points]

[1] 1. In the 19th century, the analytical engine is designed by
- a) Joseph Jacquard
- b) Blaise Pascal
- c) Charles Babbage
- d) Alan Turing
- e) Gottfried Wilhelm von Leibniz

[1] 2. This person is recognized as the first programmer in history.
- a) Charles Babbage
- b) Ada LoveLace
- c) John von Neumann
- d) Blaise Pascal
- e) Thomas Watson

[1] 3. What is the largest digit in the Base-6 system?
- a) 2
- b) 3
- c) 4
- d) 5
- e) 6

[1] 4. Directory tree is a structure showing the nested directory organization of the file system inside a computer. The directory at the highest level is called _____
- a) working directory
- b) bottom directory
- c) common directory
- d) sub directory
- e) root directory

[1] 5. In general, the process of converting analog data to digital data is called _____.
- a) encoding
- b) digitizing
- c) decoding
- d) sampling
- e) none of the above

[1] 6. Which of the following characterizes the second generation (1959-1965) of computer hardware?

a) transistors
b) vacuum tubes
c) integrated circuits
d) silicon chips
e) magnetic drum

[1] 7. The 5-bit unsigned binary representation of the decimal number 29 is

a) 11100
b) 11110
c) 11101
d) 11110
e) 11011

[1] 8. The number of bit combinations of a 6-bit data is

a) 6
b) 12
c) 32
d) 64
e) 128

[1] 9. The decimal representation of the unsigned binary number 10111.001 is

a) 21.125
b) 21.075
c) 23.125
d) 24.375
e) 25.375

[1] 10. The octal representation of the decimal number 16 is

a) 2
b) 8
c) 16
d) 20
e) 32

[1] 11. In Excel, the cell C8 contains the formula = B3. This formula is copied from cell C8 and pasted into cell E9. What will the formula look like in cell E9?

a) =C3
b) =D4
c) =E5
d) =F6
e) =G7

[1] 12. The hexadecimal representation of the unsigned binary number 001001111100 is
- a) 14B
- b) 15B
- c) 16C
- d) 27C
- e) 28D

[1] 13. _____ describes an image in terms of lines and geometric shapes.
- a) Huffman encoding
- b) Temporal compression
- c) Spatial compression
- d) Vector graphics
- e) Raster graphics

[1] 14. What is the amount of memory required to store a character called?
- a) bit
- b) file
- c) byte
- d) folder
- e) register

[1] 15. The unsigned 8-bit binary representation of the octal number 67 is:
- a) 01011011
- b) 00110111
- c) 00011111
- d) 00110110
- e) 01011110

Part B [35 points]

[4] 1. Give the 10-bit 2's complement representation of the decimal number -73. Show all your steps.

ANS:

	quotient	reminder
73/2	36	1
36/2	18	0
18/2	9	0
9/2	4	1
4/2	2	0
2/2	1	0
1/2	0	1

[2]

10-bit representation of 73 is: 0001001001
Hence, -73 is:

1110110110 + 1 = **1110110111**

(** 1 point for inverting all the bits, 1 point for adding 1 at the end)

[8] 2. Show how the following decimal number subtraction and addition are performed using 8-bit 2's complement representation in a computer. Show all your steps.

-22 + 5 - 9

ANS: 22 in 8-bit representation is: 0001 0110
So -22 in 2's complement is: 1110 1010 [2]

```
  1110 1010
+ 0000 0101
  1110 1111
```

[2]

(** 1 point for obtaining the 8 bit representation for +5, 1 point for proper arithmetic)

```
  1110 1111
+ 1111 0111
1 1110 0110
```

[4]

Final answer is: 1110 0110

(** 2 points for obtaining the 8 bit representation for -9, 2 points for proper arithmetic)

[2] 3. If the "*" is the flag character in a run-length encoding scheme, how would the following string be compressed?

CCCCDDDYYYYZZZZAA333

ANS: *C4DDD*Y4*Z4AA333

(** if student gets part of this correct, please give part marks)

[2] 4. What compression ratio is achieved in 3 ? (you can leave the answer in fraction)

ANS: 17/20 = 0.85

[2] 5. Use the following Huffman alphabet to decode the string.

e = 00 c = 1101 o = 0110 p= 10 s = 111

00001101111

ANS: eecs

[4] 6. Consider the following formula. Assuming a, b, c, d, L, M are all named ranges, write an Excel expression for this mathematical formula.

$$\frac{M^{\frac{1}{b-c}}}{a}\left(L^2-\frac{acd}{M^{\frac{1}{b}}}\right)$$

ANS: M^(1/(b-c))/a*(L^2-a*c*d/M^(1/b))

(**deduct 0.5 point for each wrong operator or wrong brackets**)

[4] 7. Perform the following hexadecimal number subtraction and addition.

A5 – 1C + 4

ANS: $(A5 - 1C)_{16} = (89)_{16}$ [2]

$(89 + 4)_{16} = 8D$ [2]

(**if student did the first part wrong but the arithmetic for the second part right, deduct 1 point**)

[2] 8. Perform the following <u>unsigned</u> binary number subtraction:

11011.110 – 1001.111

```
     0 0   0 0
  11011 . 110
-  1001 . 111
  -----------
  10001 . 111
```

ANS:

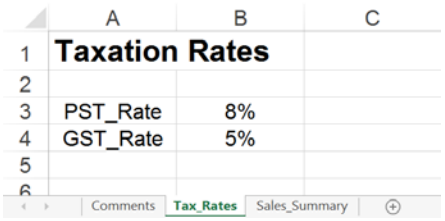
(**deduct 1 point if student did part of the arithmetic wrong**)

[3] 9. Determine the hexadecimal representation of the octal number:

4321

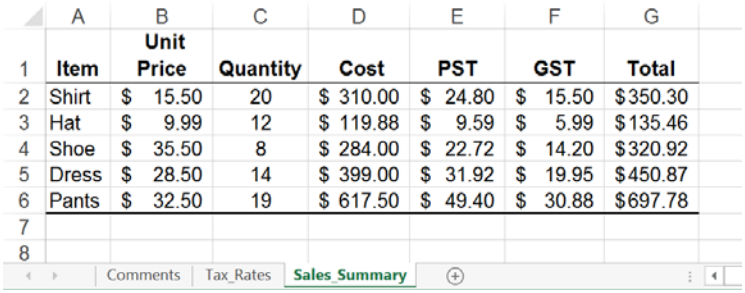
ANS:						
4	3	2	1	<- Octal	
100	011	010	001	← Binary in groups of 3 bits	[1]
1000	1101	0001		← Binary in groups of 4 bits	[1]
8	D	1		← Hexadecimal	[1]

Given the following Excel worksheet, answer the following three questions.



	A	B	C
1	**Taxation Rates**		
2			
3	PST_Rate	8%	
4	GST_Rate	5%	
5			
6			

Comments | Tax_Rates | Sales_Summary



	A	B	C	D	E	F	G
1	**Item**	**Unit Price**	**Quantity**	**Cost**	**PST**	**GST**	**Total**
2	Shirt	$ 15.50	20	$ 310.00	$ 24.80	$ 15.50	$350.30
3	Hat	$ 9.99	12	$ 119.88	$ 9.59	$ 5.99	$135.46
4	Shoe	$ 35.50	8	$ 284.00	$ 22.72	$ 14.20	$320.92
5	Dress	$ 28.50	14	$ 399.00	$ 31.92	$ 19.95	$450.87
6	Pants	$ 32.50	19	$ 617.50	$ 49.40	$ 30.88	$697.78
7							
8							

Comments | Tax_Rates | Sales_Summary

Unit Price, **Quantity** are given data; **Cost**, **PST, GST and Total** are calculated using named ranges. The cell **Tax_Rates!B3** is defined as **PST_Rate** using named range**.**

[1] 10. Based on the given information, assume that we are in "formula view", write down the formula that you would see in cell D4 in the **Sales_Summary** worksheet.

ANS: =Unit_Price*Quantity

[2] 11. Write down a formula that you would enter to calculate the **PST** in the **Sales_Summary** worksheet.

ANS: =Cost*PST_Rate

[1] 12. A formula: **=SUM(Quantity)** is entered in cell C8, what is the actual value in cell C8?

ANS: sum of the range of cells: C2 to C6

So the answer is 20 + 12 + 8 + 14 + 19 = 73