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EECS 1520.03 COMPUTER USE: Fundamentals

Test 2 (Solutions)
November 20, 2014

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.
- An **EXCEL FUNCTION LIST** is attached at the end.

Part	Value	Mark
A	**20**	_____
B	**30**	_____
Total:	**50**	

Part A [20 points]

[1] 1. _____ is the time it takes for the read/write head of the hard-disk drive to get into position over the specified track of a disk.

a) rotational delay
b) seek time
c) latency
d) access time
e) transfer rate

[1] 2. Inside a CPU, _____ contains the address of the next instruction to be executed.

a) instruction register
b) control unit
c) program counter
d) memory data register
e) ALU

[1] 3. How many possible outcomes can be resulted in a multiplexer with 3 control lines?

a) 3
b) 4
c) 6
d) 8
e) 9

[1] 4. In a magnetic disk, a concentric circle on the surface of the disk is called _____

a) cylinder
b) ring
c) block
d) sector
e) track

[1] 5. Which gate produces a 0 only if all its inputs are 0?

a) AND
b) OR
c) NOR
d) NAND
e) XOR

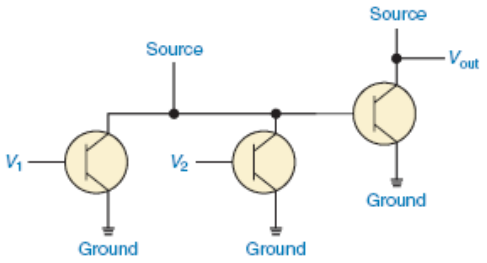
[1] 6) "A + B = B + A" is an example of which of the following properties?

a) Commutative
b) Associative
c) Distributive
d) Identity
e) none of the above

[1] 7) _____ serves as both an input and output device.

a) monitor
b) printer
c) touchscreen
d) scanner
e) plotter

[1] 8) The following transistor diagram implements which gate?



a) AND
b) OR
c) NOR
d) NAND
e) XOR

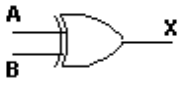
[1] 9) How many transistors are needed to implement an NAND gate?

a) 1
b) 2
c) 3
d) 4
e) none of the above

[1] 10) Which gate produces a 1 only if all its inputs are 1 and a 0 otherwise?

a) AND
b) OR
c) NOR
d) NAND
e) XOR

[1] 11) The following logic diagram represents which gate?



a) AND
b) OR
c) NOR
d) NAND
e) XOR

[1] 12) "A(B+C) = (AB) + (AC)" is an example of which of the following properties?

a) Commutative
b) Associative
c) Distributive
d) Identity
e) DeMorgan's law

[1] 13) Inside the control unit of a CPU, _____ contains the instruction that is being executed.

a) instruction register
b) control unit
c) program counter
d) memory data register
e) ALU

[1] 14) A half-adder consist of

a) an OR gate and a NOT gate
b) an AND gate and a NOR gate
c) an AND gate and a XOR gate
d) an OR gate and a XOR gate
e) an OR gate and an NAND gate

[1] 15) The prefix ***tera*** refers to which power of ten?

a) 10^{-12}
b) 10^{-9}
c) 10^{9}
d) 10^{12}
e) 10^{15}

[1] 16) The processing cycle within the CPU in a von Neumann machine is called:

a) Execute-Decode-Fetch cycle
b) Fetch-Decode-Execute cycle
c) Fetch-Decode-Fetch-Execute cycle
d) Decode-Fetch-Execute cycle
e) Decode-Fetch-Execute-Fetch cycle

[2] 17) What result is produced when the following Excel expression is evaluated?

=LEN(CONCATENATE(LEFT("EECS",2),1520))

⇨ The length of "EE1520" is 6

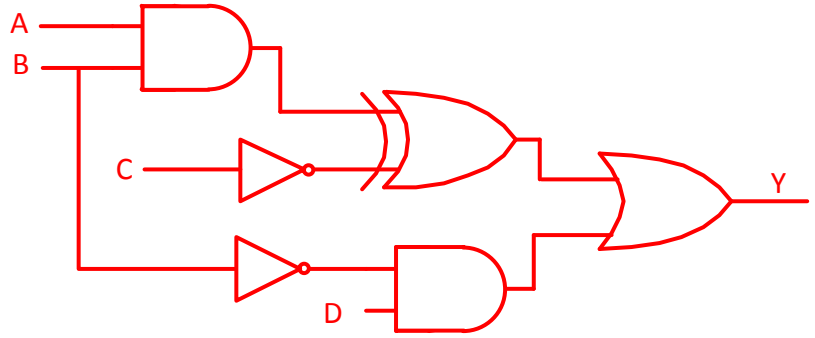
[2] 18) Two single bits are defined as A and B in Excel using named ranges. Write out a function in Excel that gives the output of the "OR" operation between A and B.

⇨ IF(OR(A,B),1,0)

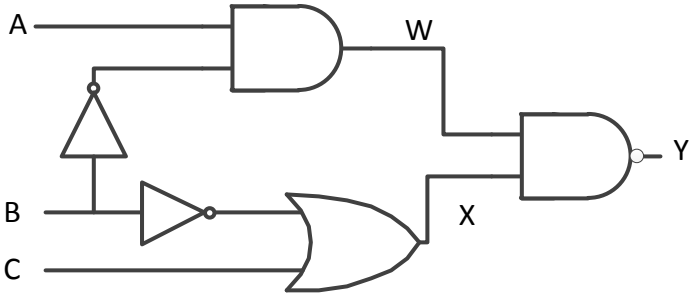
Part B [30 point]

[5] 19) Draw the circuit diagram of the following Boolean expression. Show all your steps.

$$Y = \left((A \bullet B) \oplus \overline{C}\right) + \left(\overline{B} \bullet D\right)$$



[4] 20) Complete the truth table for the following circuit:



A	B	C	W	X	Y
0	0	0	0	1	1
0	0	1	0	1	1
0	1	0	0	0	1
0	1	1	0	1	1
1	0	0	1	1	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	1	0	1	1

****note** 1 pt for columns A,B,C**
1 pt for column W, 1 pt for column X, 1 pt for column Y

[2] 21) How many transistors are required to implement the circuit in 20)

2 NOT gates require 2 transistors, 1 AND gate requires 3 transistors, 1 OR gate requires 3 transistors, 1 NAND gate requires 2 transistors, so the total is **10**

[4] 22) What is the corresponding Boolean expression for the circuit in 20)

$$\overline{\left(A \bullet \overline{B}\right)} \bullet \left(\overline{B} + C\right)$$

[4] 23) The memory of a CPU consists of a small program as shown in **TABLE 3**, the op-code is 4 bits and each memory cell can hold 1 byte of data. The list of op-codes is given in **TABLE 2**. Describe what the program in **TABLE 3** does. Show all your steps.

TABLE 2.

Op-code	**Functions**
0000	HALT
0001	LOAD
0010	STORE
0011	ADD
0100	SUBTRACT
0101	SHIFT LEFT
0110	SHIFT RIGHT
0111	BRANCH
1000	BRANCH ON ZERO

TABLE 3.

	Memory
0000	
0001	
0010	
0011	
0100	00011000
0101	01001001
0110	00101010
0111	00000000
1000	00001000
1001	00000100
1010	
1011	
1100	
1101	
1110	
1111	

[1] At cell address 0100, it **loads** the data from cell 1000, so it loads the number 8 in decimal
[1] At cell address 0101, it **adds** the data in cell 1001, so it adds the number 4 in decimal to the previous cell
[1] At cell address 0110, it **stores** the data to cell 1010
[1] At cell address 0111, the program **stops**

24) *Use only the data shown to answer the following questions.*
*All ranges have been **named** using the labels that appear in the worksheet.*

The right worksheet lists the marks of 8 individuals, and the left worksheet classifies the marks with their grades.

	A	B
1		
2		
3	**Marks range**	**Grade**
4	0	F
5	50	D
6	60	C
7	80	B
8	90	A
9		
10		
11		

Final_marks | Lookup | Sheet3

	A	B	C	D	E
1		**Name**	**Marks**	**Final Grade**	**Bonus point**
2		Peter	90		
3		Jane	75		
4		Mary			
5		Tommy	50		
6		Sam			
7		Jessica	95		
8		Stan	40		
9		Roger	88		
10					
11		**Average**	73.0		

Final_marks | Lookup | Sheet3

****Complete tasks a) and b) and put all your results in TABLE I on next page****

[4] **a)** Suppose the following formula has been entered in the column labelled "**Final Grade**" (i.e. D2 to D9) in the **Final_marks** worksheet:

=IF(ISNUMBER(Marks),LOOKUP(Marks,Marks_range,Grade),"Not Completed")

Complete the cells from D2 to D9 to show what would be seen in the data view of the **Final_marks** worksheet

[4] **b)** Suppose cell C11 is defined as "**Average**" and the following formula has been entered in the column labelled "**Bonus Point**" in the **Final_marks** worksheet:

=IF(AND(Marks>Average,Final_Grade="A"),"Yes","No")

Complete the cells from E2 to E9 to show what would be seen in the data view of the in the **Final_marks** worksheet

TABLE I.

Name	Marks	Final Grade [4]	Bonus point [4]
Peter	90	A	Yes
Jane	75	C	No
Mary		Not Completed	No
Tommy	50	D	No
Sam		Not Completed	No
Jessica	95	A	Yes
Stan	40	F	No
Roger	88	B	No

[3] 25) *Use only the data shown to answer the following questions.*
All ranges have been ***named*** *using the labels that appear in the* **Sales** *worksheet.*

	A	B	C
1			
2		**Sales Region**	**Sales Total**
3		North	$ 280,000
4		South	$ 590,000
5		East	$ 630,000
6		West	$ 960,000
7			

Sales | Summary by Region | Sheet3

	A	B	C	D
1		**Last Name**	**Region**	**Sales**
2		Au	North	$ 150,000
3		Bernier	South	$ 220,000
4		Bince	South	$ 370,000
5		Bushby	East	$ 190,000
6		Campbell	West	$ 260,000
7		Carrick	West	$ 410,000
8		Fraser	East	$ 330,000
9		Hon	East	$ 110,000
10		Smith	West	$ 290,000
11		Ison	North	$ 130,000
12				

Sales | Summary by Region | Sheet3

The **Summary by Region** worksheet calculates the "**Sales total**" from each region as shown by cells: C3 to C6. Provide an Excel function that you would enter in cell ***C3*** to obtain the sales total:

The sales total in cell C3 can be obtained using the "SUMIF" function:
= SUMIF(Region,B3,Sales)

1 pt for using SUMIF function, 2 pts for the correct use of it

EXCEL FUNCTION LIST

SUM (range)
MIN (range)
MAX (range)
AVERAGE (range)
SIN (number)
PI ()
COS (number)
RAND ()
ROUND (number, num_digits)
ROUNDUP (number, num_digits)
COUNTIF (range, criteria)
PRODUCT (number1, number2, …)
LOOKUP (lookup_value, lookup_vector, result_vector)
STDEV (number1, number2, …)
IF (logical_test, value_if_true, value_if_false)
AND (logical1, logical2, …)
OR (logical1, logical2, …)
NOT (logical)
TRUE ()
FALSE ()
ISBLANK (Value)
ISERR (Value)
ISERROR (Value)
ISLOGICAL (Value)
ISNA (Value)
ISNONTEXT (Value)
ISNUMBER (Value)
ISREF (Value)
ISTEXT (Value)
CONCATENATE (string1, string2)
EXACT (string1, string2)
LEFT (string, number_of_characters)
LEN (string)
LOWER (string)
MID (string, start_position, number_of_characters)
RIGHT (string, number_of_characters)
TEXT (value, format_text)
UPPER (string)
VALUE (string)
SUMIF (range, criteria, sum_range)
VLOOKUP (lookup_value, table_array, col_index_num)
MATCH (lookup_value, lookup_array, match_type)
INDEX (array, row_num, col_num)