Name: _____, _____
(Last name) (First name)

Student ID#: _____

Registered Section: _____

Instructor: Lew Lowther

Solutions

# York University

Faculty of Pure and Applied Science
Department of Computer Science

## EECS 1520.03 COMPUTER USE: Fundamentals
## Test 1 – Version B

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 ID# at the top of each odd numbered page.
- Answer ALL questions.
- Time allowed is **50** minutes.
- Use of all electronic devices is **PROHIBIED**.
- There are **5** pages of questions in addition to the cover. Please count them.

| Part | Value | Mark |
|---|---|---|
| A | 5 | _____ |
| B | 7 | _____ |
| C | 2 | _____ |
| D | 5 | _____ |
| E | 5 | _____ |
| F | 1 | _____ |
| G | 15 | _____ |
| H | 10 | |
| ***Total:*** | ***50*** | _____ |

## Part A [5 points]

For each of these concepts, write the generation in which it was first used into the blank, and circle the history (**hardware** or **software**) to which it belongs.

| | | |
|---|---|---|
| COBOL | _____2 | hardware / software |
| large scale integration | _____4 | hardware / software |
| magnetic tape drives | _____1 | hardware / software |
| systems programmers | _____1 | hardware / software |
| vacuum tubes | _____1 | hardware / software |

## Part B [7 points]

A pattern of binary digits can be interpreted in several different ways.
Show how the pattern **01001010** translates using each of the following interpretations.

| | |
|---|---|
| unsigned integer | 74 |
| integer in 2's complement notation | +74 |
| integer in excess notation | -54 |
| Hexadecimal short form | 4A |
| Octal short form | 112 |
| floating point notation | +⅝ |
| ASCII | J |

## Part C [2 points]

1. In EECS1520, how many of a student's test grades can be annulled?
   a) None
   b) Only Test 2
   c) Only Test 1
   d) 0, 1, or 2

2. At what point in the course can a student in EECS1520 annul a test grade?
   a) Before the test
   b) Immediately after the test
   c) At the end of the term
   d) Never

## Part D [5 points]

1) In general, the process of converting analog data to digital data is called _____.

   a) digitizing
   b) reset
   c) encoding
   d) sampling
   e) reclocking

2) The process of correcting degradation to digital data is called _____.

   a) digitizing
   b) reset
   c) encoding
   d) sampling
   e) reclocking

3) _____ stores the differences between consecutive frames of a video.

   a) Huffman encoding
   b) Keyword encoding
   c) Run length encoding
   d) Spatial compression
   e) Temporal compression

4) A continuous representation, corresponding to the actual information it represents.

   a) analog data
   b) digital data

5) Some information may be lost in the process of compression.

   a) lossless
   b) lossy

## Part E [5 points]

This partial worksheet generates random Moves for playing Rock/Paper/Scissors.

| **RandomNum** | 0 | 2 | 2 | 0 | 1 |
|---|---|---|---|---|---|
| **Move** | Rock | Scissors | Scissors | Rock | Paper |

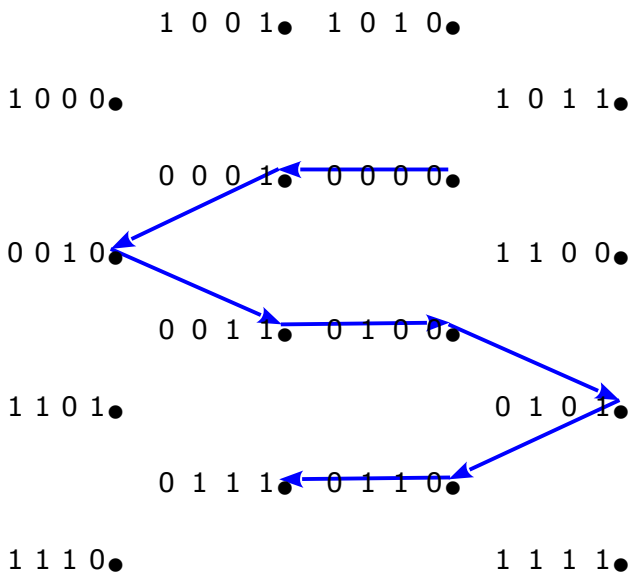
1. **RandomNum** is a randomly generated integer: 0, 1, or 2.
   Write a single Excel formula to create the values of **RandomNum**. [3]
   =INT( RAND() * 3)

2. An Excel worksheet that contains data values that remain constant throughout the spreadsheet model would usually be called:
   a) Comments
   b) Parameters
   c) Graph
   d) Summary
   e) Main Data

3. In Excel, a cell in a spreadsheet can contain:
   a) a formula
   b) a literal value
   c) a literal string
   d) any of the above
   e) none of these

## Part F [1 point] – Join the Dots

The dots below are labelled (on the left) in **2's Complement** notation.
Connect the dots that have **positive** numbers as labels.
Start with the smallest value and proceed to the largest.



## Part G [15 points]

1. In 5-bit, Excess notation, how many of the patterns represent negative numbers?[1]

16

2. Perform the following calculation in Binary:[1]

```
  0010.1001
+ 0001.0011
  0011.1100
```

3. Express the answer above as a proper fraction in decimal.[1]

3¾

4. Show how to encode this value in 8-bit binary Floating Point notation.[1]

01101111

5. Show how a computer would use 8 bit binary notation to compute the following. [5]

57 / 25

| | | |
|---|---|---|
| 25 converts to | 00011001 | |
| So -25 is | 11100111 | 1 |
| 57 converts to | 00111001 | 1 |
| Add 57 and -25 | 1 00100000 | 1 |
| The remainder is larger than the divisor so add -25 again | 11100111 | |
| | 10 00000111 | 2 |

6. Perform the following calculation in Binary using the optimized method.[6]

27 * 34

| | | |
|---|---|---|
| = 27 * (32 + 2) | | 1 |
| = 27 * $2^5$ + 27 * $2^1$ | | 1 |
| 27 converts to | 11011 | 1 |
| | | |
| *$2^5$ | 1101100000 | 1 |
| *2 | 110110 | 1 |
| | | |
| Add them | 1110010110 | 1 |

## Part H [10 points] – Short!! Answer

1) If the "*" is the flag character in run-length encoding, how would the following string be compressed?

AAAAAABBBCDDDDDEEEEE

*A6BBBC*D5*E5

2) What is the compression ratio achieved by this process?

13/20 or .65 or 65%

3) Using the same style for run-length encoding, unpack the following :

*N7X*M4*24SSS

NNNNNNNXMMMM2222SSS

4) Use the following Huffman alphabet to encode the string.
a = 00 m = 1111 s = 110 b = 1110 o = 01 t= 10

"tomato"

10011111001001

5) Using the same Huffman alphabet, decode the following:

"1110010010110"

boats

6) What compression ratio was achieved by this encryption?

Original size: 5 characters @ 8 bits each = 40 bits
13/40 or .325 or 32.5%

7) What is the term that refers to the amount of data that is used to represent a colour?

colour depth

8) What basic colours are used by computer monitors to produce coloured images?

red, green, blue

9) _____ describes an image in terms of lines and geometric shapes

vector graphics

10) If an image's size is 150 X 200 pixels, and is stored in TrueColor format, how many bytes of memory are needed to store the image without compression?

150 * 200 = 30,000 pixels * 3 bytes/pixel = 90,000 bytes