EECS 1520 Test 1 ID#:_____

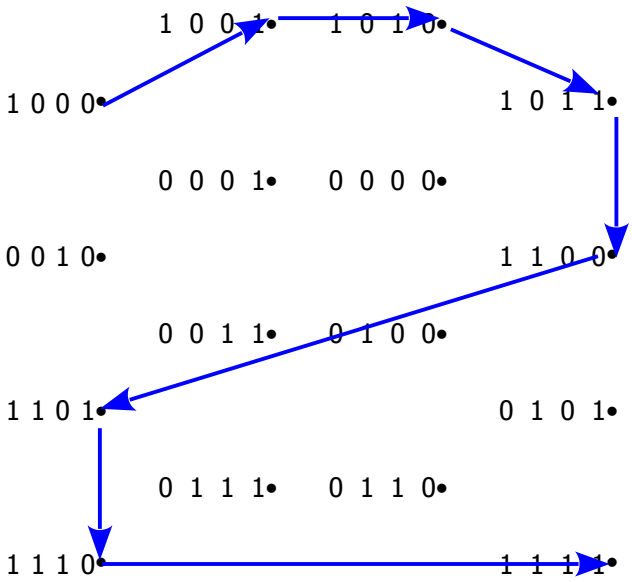
Part A [5 points]

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

machine language	_____1	hardware / software
magnetic cores	_____2	hardware / software
Object-Oriented Design	_____5	hardware / software
transistors	_____2	hardware / software
word processors	_____4	hardware / software

Part B [1 point] – Join the Dots

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



Part C [6 points] – Complete the table.

Show how the pattern **01101000** translates using each of the following interpretations. [1 each]

unsigned integer	104
integer in 2's complement notation	+104
integer in excess notation	-24
Hexadecimal notation	68
floating point notation	+2
ASCII	h

Part D [8 points]

1) Perform the following calculation in Binary: [1]

```
 0001.0001
+0010.0011
 0011.0100
```

2) Express the answer for 1) as a **proper fraction**. [1]

3¼

3) Show how this value would be coded in 8-bit Floating Point Notation. [1]

01101101

4) Show an **optimised** calculation for the following binary multiplication.
Show all your steps. [5]

27 * 34

27 * 34 can be expressed as	27 * (2 + 32)	1
27 converts to	11011	1
27 * 2 =	110110	1
27 * 32 =	1101100000	1
27 * 32 + 27 * 4 =	1110010110	1

Part E [10 points] – Short!! Answer

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

*W7*56SOS*N4
WWWWWWW555555SOSNNNN

2. What compression ratio was achieved by encoding the string?
12/20 or .60 or 60%

3. Use the following Huffman alphabet to encode the string.
   e = 00 t = 1111 s = 110 h = 1110 r = 01 a= 100 c=101

"carts"
101100011111110

4. _____ uses short patterns to represent common characters and longer patterns to represent characters less frequently used.
   a) Huffman encoding
   b) keyword encoding
   c) run length encoding
   d) spatial compression
   e) temporal compression

5. A continuous representation, corresponding to the actual information it represents.
   a) analog data
   b) digital data

6. Some information may be discarded in the process of compression.
   a) lossless
   b) lossy

7. The process of correcting degradation to digital data is called _____.
   a) digitizing
   b) encoding
   c) pulse-code modulation
   d) re-clocking
   e) sampling

8. What is the term that refers to the number of pixels used to represent an image?
resolution

9. _____ describes an image in terms of the colour of each picture element.
raster graphics

10. If an image's size is 600 X 500 pixels, and the colour is stored in 24 bits, how many **bytes** of memory are needed to store the image without compression?

600 * 500 = 300,000 pixels * 3 bytes/pixel = 900,000 bytes

Part F [6 points]

1. Which Excel function can be used to calculate the total of a list?
   a) AVERAGE
   b) MAX
   c) MEDIAN
   d) MIN
   e) SUM

2. Which of the following is not a function category in Excel?
   a) Date & Time
   b) Information
   c) Math & Trig
   d) Random
   e) Text

3. A worksheet that contains values that are constant throughout the model would usually be called:
   a) Comments
   b) Graph
   c) Main Data
   d) Parameters
   e) Summary

4. A column in an Excel worksheet named **Letter Grade** contains the formula

   =IF(Score<80,"B",IF(Score<70,"C",IF(Score<60,"D",IF(Score<50,"F","A"))))

What will appear in **Letter Grade** when **Score** is 91?

a) A b) B c) C
d) D e) F

5. Referring to the formula in the previous question, what will appear in **Letter Grade** when **Score** is 55?

a) A b) B c) C
d) D e) F

6. A company decides to give some of its employees a holiday bonus. Those who have been employed at the company for at least 10 years get a bonus if their performance is considered either *good* or *excellent*. Those who have not been employed at the company that long get a bonus only if their performance is considered *excellent*. Assume the columns are named as shown.

Years	Rating	Bonus
3	excellent	YES
15	poor	NO
12	acceptable	NO
2	good	NO
10	good	YES

Which formula could have been used to calculate the values in the **Bonus** column.

a) =IF(OR(AND(Years<10, Rating="good"),Rating="excellent"),"YES","NO")
b) =IF(OR(AND(Years>=10, Rating="good"),Rating="excellent"),"YES","NO")
c) =IF(Rating="good" AND IF (Years>=10," YES "," NO"))
d) =IF(Rating>="good",IF(Years>=10,"YES", "NO"),"NO"))
e) =IF(Years>=10 AND (Rating>="good"),"Yes","No")

Part G [10 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. **Move** is Rock when **RandomNum** is 0, Paper when **RandomNum** is 1, and Scissors otherwise.
   Write a single Excel formula to display the appropriate **Move**s. [7]

=IF(RandomNum=1, "Rock", IF(RandomNum=2, "Paper", "Scissors"))

Part H [4 points]

All ranges have been named.

Lower bound	Letter Grade
0	F
40	E
50	D
55	D+
60	C
65	C+
70	B
75	B+
80	A
90	A+

Use this table to assign a **Grade** for each **Score**.

Score	Grade
40	E
61	C
44	E
52	D
33	F
69	C+
57	D+
33	F
64	C
55	D+

This is a partial list of **Score**s showing the appropriate **Grade** for each.

Write the formula for the **Grade** column.

=LOOKUP(Score, Lower_bound, Letter_Grade)