

CS61C Final Review – Problems

1. 1001 0010 0000 1000 1111 1111 1111 1111
 - a. Interpret this binary string as a two's compliment integer
 - b. Interpret this binary string as a floating point number
 - c. Interpret this binary string as a MIPS instruction
2. How many things can N bits represent?
3. C Problem:

```
typedef struct node {
    int value;
    struct node* next;
} ent;
stack push(stack s,int val){

}
typedef ent * stack;
int peek(stack s){

}
stack pop(stack s,int * val){

}
```

4. Implement the push function above in MIPS

```
Push:  
  
    li $a0, 8  
    jal malloc  
  
    jr $ra
```

5. Determine the Boolean expression for F

<u>A</u>	<u>B</u>	<u>C</u>	<u>F</u>
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

6. How many gates are there for a Boolean function of m inputs and n outputs?

7. Simplify your Boolean expression from 5 using Boolean Algebra

8. Draw the cache and label each access as a hit or miss (and what type of miss)

32 KiB Addressable Memory,
1 KiB Cache Size,
128 B Block Size,
LRU Replacement,
2-way set associative

Memory Accesses:

0x000C
0x10D0
0x2000
0x12D0
0x10D8
0x14D0

9. Indicate the mappings and provide the PPNs for each access:

1 MiB Virtual Memory Space,
32 KiB Physical Memory
4 KiB Page Size

Memory Accesses:

0x000C
0x200D0
0x10000
0x202D0
0x200D8
0x204D0

10. Give an expression for AMAT of a system with VM (with TLB) and Cache

11. Memory Read – 10%, CPI = 18
Memory Write – 15%, CPI = 20
ALU – 30%, CPI = 1
Branch – 45%, CPI = 2
Overall CPI?

CPU Speed = 1 GHz, 1 Million instructions, CPU Time?

Cache added. Memory Read/Write halved. Improvement?

12. What is the effective speed of a 100 Mbps network that has a 100ms overhead for a transfer of 2 Megabytes.

13. Define and draw each of the Following RAID systems: 0, 1, 4, 5