

Solutions:

1.

```
struct point { int x; int y; } - 8
struct rectangle { struct point pt1; struct point pt2 ;} - 16
struct tree { int value; struct tree *left; struct tree *right; } - 12
struct stringList{ char * value; struct stringList * next;} - 8
```

2.5 for each correct answer

2. CSE 30 COMPUTER ORGANIZATION

"CSE" = 2.5; "30" = 2.5; "COMPUTER" = 5; "ORGANIZATION" = 5; -2 if not in CAPS; -3 for reversed string; -3 for incomplete string; -1 for separated string

3.

```
bitReverse(int x)
{
    //create variable to store reversed value = temp
    unsigned int temp = x;
    int i=0;
    for (i = 0; i < 31; i++)
    {
        temp = temp | (x & 1); //check for LSB
        temp = temp << 1;
        x = x >> 1;
    }

    temp = temp | (x & 1);
    return temp;
}
```

-1 if no comments; -1 for every line error in code; -7 if wrong code/Algorithm; 3/15 if the student did not understand the question

4.

```
int changeByte ( int num, unsigned int byteNum, char newValue) {
    int result ;
    int mask = 0xFF ;
    int new = newValue & mask ;

    mask = mask << (8 * byteNum) ;
    mask = ~mask ;
    new = new << (8 * byteNum) ;
    result = num & mask ;
}
```

```
        result = result | new ;
        return result ;
    }
```

-1 if no comments; -1 for every line error in code; -7 if wrong code/Algorithm; 3/15 if the student did not understand the question

5.

```
int sumArray ( int *begin, int *end) {
    int sumResult = 0;

    while(begin != end+1){
        sumResult += *begin;
        begin++;
    }

    return sumResult ;
}
```

-1 if no comments; -1 for every line error in code; -7 if wrong code/Algorithm; 3/15 if the student did not understand the question

6.

```
int stringContains(char* string, char* substring)
{
    int i,j;
    for(i = 0; string[i] != '\0'; ++i)
        for(j = 0; substring[j] != '\0';)
        {
            printf("comparing: %c & %c\n", string[i+j], substring[j]);

            if(string[i+j] != substring[j])
            {
                printf("not equal, breaking\n");
                break;
            }

            if(substring[+ +j] == '\0')
                return 1;
        }
    return 0;
}
```

-1 if no comments; -1 for every line error in code; -7 if wrong code/Algorithm; 3/15 if the student did not understand the question

7.

Minimal number of additional registers: 0, with 5 cycles

```
sub $s0, $s1, $s2
addi $s0, $s0, -30
add $s0, $s0, $s3
sub $s0, $s0, $s4
add $s0, $s0, $s5
```

Minimal number of cycles: 3, with 1 additional register

```
sub $s0, $s1, $s2; addi $t0, $s3, -30
sub $s0, $s0, $s4; add $t0, $t0, $s5
add $s0, $s0, $t0
```

"For prob 7a (10pts):

-1 : for extra register

-1 : for extra cycle

-2: if the logic is wrong

-5: if they didn't understand it

For prob 7b (10pts):

-5 : if they save to a register twice in one cycle."