

Question 1: Circle the correct answer:

Name: _____

- Output A:** Selection Insertion None Both
Output B: Selection Insertion None Both
Output C: Selection Insertion None Both
Output D: Selection Insertion None Both
Output E: Selection Insertion None Both
Output F: Selection Insertion None Both

Email: _____

Part 2: Show the partition:**Question 2: Show me how you change this code to answer the question:**

```
class XXX {
public:
    long long GetCounts(int N);
    long long gc(string s, int zero);
};

long long XXX::gc(string s, int zero)
{
    int i, f, nz;
    string r, news;
    long long rv, one, rplus1;

    if (s.size() == 0) return 0;

    one = 1;
    rv = 0;

    if (s.size() == 1) {
        for (i = 1; i <= s[0]-'0'; i++) rv ^= (1L << i);
        if (zero) rv ^= 1;
        return rv;
    }

    f = s[0] - '0';
    for (i = 1; i < s.size() && s[i] == '0'; i++) ;
    nz = i-1;
    r = s.substr(nz+1);

    rplus1 = (r == "") ? 0 : atoi(r.c_str());
    rplus1++;

    rv ^= ((1L << f)*rplus1);
    rv ^= rplus1;

    if (r != "") rv ^= gc(r, 1);

    if (s[0] == '0') return rv;

    if (zero || s[0] > '1') news.push_back(s[0]-1);
    for (i = 1; i < s.size(); i++) news.push_back('9');
    return rv ^ gc(news, zero);
}

long long XXX::GetCounts(int N)
{
    string s;
    char buf[20];

    sprintf(buf, "%d", N);
    s = buf;
    return gc(s, 0);
}
```

Name: _____

Email: _____

Question 4: Circle the correct answer:

- A: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
B: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
C: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
D: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
E: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
F: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
G: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
H: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
I: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
J: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
K: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$
L: $O(1)$ $O(\alpha(n))$ $O(\log n)$ $O(n)$ $O(n \log n)$ $O(n \alpha(n))$ $O(n^2)$ $O(n^2 \log n^2)$ $O(n!)$ $O(2^n)$

Put the answers to questions 3 and 5 below and on extra sheets.