CASE FILE: THE GHOST IN THE STACK (CS101-GD5)

Briefing: As a group, work together to solve all these anomalies. Discuss your leads and make sure everyone deciphers the mystery.

1. The following code sometimes prints garbage value and sometimes crashes randomly with segmentation fault or division-by-zero error. Explain what is wrong with it using technical terms. Can you tell exactly what makes the code output garbage value? What exactly happens when it gives segmentation fault or division-by-zero error?[1]

```c
int arr[] = {4, 2};
double rec = 1.0/arr[-1]; //should be 0.50
printf("reciprocal=%lf", rec);
```

2. What is wrong with the following function?

```c
int* getNumber() {
  int x = 101;
  return &x;
}
```

3. What is the output of `fun(23)`?

```c
void fun(int n) {
  if (n == 0) {
    return;
  }
  fun(n / 2);
  printf("%d", n % 2);
}
```

4. What is the output of the following code?

```c
char c = 'A';
do {
    printf("%c", c);
} while((c+=2)<'G');
```

5. Why do both these functions return the same result? Explain using technical terms.

```c
int is_palin_1(int arr[], int n) {
  for(int i=0; i<n; i++) {
    if(arr[i] != arr[n-i-1]) {
      return 0;
    }
  }
  return 1;
}
```

```c
int is_palin_2(int arr[], int n) {
  if(n<1) return 1;
  if(arr[0] != arr[n-1]) return 0;
  return is_palin_2(arr+1, n-2);
}
```

[1] Hint: You should talk about what **`arr-1`** refers to on the stack.