

CS2263 Lab 2 – Isaac Shoebottom

Exercise 1:

1. Yes, they are the same. This is because we all compiled the same source code and ran the same program. If the values are different, there would be something very wrong.
2. No, they're not the same. They can vary due to that memory on your operating systems is constantly being moved and programs ask for new memory and create new stack frames all the time. You can see that by running the same program twice. The addresses should change, assuming your computer is doing anything else in the meantime.
3. They're smaller, because they are created in a stack frame lower in memory than the function g2 above it.

Source code:

```
/* p1.c */
#include <stdio.h>
#include <stdlib.h>

int g1(int a, int b){
    int c = (a + b) * b;
    printf("g1: %d %d %d \n", a, b, c);
    printf("a's address is %p, b's address is %p, c's address is %p\n", &a, &b, &c);
    return c;
}

int g2(int a, int b){
    int c = g1(a + 3, b - 11);
    printf("g2: %d %d %d \n", a, b, c);
    printf("a's address is %p, b's address is %p, c's address is %p\n", &a, &b, &c);
    return c - b;
}

int main (int argc, char** argv){
    int a = 5;
    int b = 17;
    int c = g2(a - 1, b * 2);
    printf("main: %d %d %d \n", a, b, c);
    printf("a's address is %p, b's address is %p, c's address is %p\n", &a, &b, &c);
    return EXIT_SUCCESS;
}
```

Output:

```
g1: 7 23 690
a's address is 0x7fff77c1a4bc, b's address is 0x7fff77c1a4b8, c's address is 0x7fff77c1a4cc
g2: 4 34 690
a's address is 0x7fff77c1a4ec, b's address is 0x7fff77c1a4e8, c's address is 0x7fff77c1a4fc
main: 5 17 656
a's address is 0x7fff77c1a52c, b's address is 0x7fff77c1a528, c's address is 0x7fff77c1a524
```

Exercise 2:

1. The backtrace values are unrelated to the addresses of the variables. They are the memory locations of the stack frames themselves. The actual variables are much higher in memory than the stack frames. The two are related but the location of them in memory is unrelated.

g2: There are 2 frames shown, main and g2.

```
Backtrace
#1 0x000000000400625 in main () at lab2.c:22
#0 g2 () at lab2.c:13
```

g1: There are 3 frames shown, main, g2, and g1.

```
Backtrace
#2 0x000000000400625 in main () at lab2.c:22
#1 0x0000000004005ac in g2 () at lab2.c:13
#0 g1 () at lab2.c:6
```

Exercise 3:

isFib:

```
Backtrace
#1 0x00000000040079d in main () at isFibPrime.c:15
#0 isFib () at isFib.c:8
```

isPrime:

```
Backtrace
#1 0x0000000004007ac in main () at isFibPrime.c:15
#0 isPrime () at isPrime.c:3
```