CSSE 332 -- Operating Systems

Quiz II: C Review Part 2

Name: Solution Key

Question 1. (5 points) Consider an array of integers created on the heap using

```
int *array = malloc(10 * sizeof(int));
```

Which of the following expressions can be used to access the **sixth** element of the array?

A. `*array + 5`

B. `*array + 6`

C. `*(array + 5)`

D. `*(array + 6)`

E. `*(array + 6*sizeof(int))`

F. `*(array + 5*sizeof(int))`

Question 2. Consider a pointer to a custom structure (defined elsewhere) declared as

```
struct cool_struct *p;
```

(a) (5 points) If we add `5` to p (i.e., do something like `q = p + 5;`), by how many bytes will `q` be away from `p`? `5 * sizeof(struct cool_struct)`

(b) (10 points) We would like to move `p` exactly **16** bytes forward and then read the following 4 bytes as an integer. Suggest a way to achieve that using pointer arithmetic.

Note: You do not have access to the code of `struct cool_struct` and so it cannot be changed.

Solution:

```
1 void *ptr = (void *)p;
2 ptr += 16;
3 int *ip = (int*)ptr;
```

Question 3. (5 points) Consider the following snippet of code:

```c
int add(int x, int y) { return x + y; }

int sub(int x, int y) { return x - y; }

int main(int argc, char **argv) {
  int a = read_int_from_user(); // assume this is implemented elsewhere
  int b = read_int_from_user();
  char op = read_op_from_user();

  int (*op_fn)(int, int) = (op == '+') ? sub : add;
  printf("%d %c %d = %d\n", a, op, b, op_fn(a,b));

  return 0;
}
```

What would be the output on the screen if the user inputs `1`, `3`, and `'-'` when prompted by this program?

Solution: It will print out `1 - 3 = 4` because the function pointer is incorrectly assigned.