Quiz 9

* Required

1. **Email address** *

ANSWER KEY

2. **Which of these programs uses memory in an unsafe way? Choose ALL that apply.** *

```
// A
int main() {
  int* ns = malloc(sizeof(int) * 3);
  *(ns + 4) = 12;
  free(ns);
}
```

```
// B
int main() {
  int* ns = malloc(sizeof(int) * 3);
  *(ns + 2) = 12;
  free(ns);
}
```

```
// C
int main() {
  int* ns = malloc(sizeof(int) * 2);
  free(ns);
  *ns = 22;
}
```

```
// D
int main() {
  int* ns = malloc(sizeof(int) * 2);
  *ns = 22;
  free(ns);
}
```

Check all that apply.

- [x] A
- [ ] B
- [x] C
- [ ] D

3. **This program prints "5 10". Which description below best describes why?** *

```c
#include <stdio.h>
#include <stdlib.h>
struct Node {
  int value;
  struct Node* next;
};

void f(struct Node* n1, struct Node* n2) {
  n1 = n2;
  n1->value = 10;
}

int main() {
  struct Node* a_node = malloc(sizeof(struct Node));
  a_node->value = 5;
  a_node->next = NULL;

  struct Node* another_node = malloc(sizeof(struct Node));
  another_node->value = 15;
  another_node->next = NULL;

  f(a_node, another_node);

  printf("%d %d\n", a_node->value, another_node->value);

  return 0;
}
```

Mark only one oval.

- ◯ Because malloc used the same area in memory for both nodes
- ◯ Because the change to n1->value doesn't last after the function f returns, so the memory referenced by a_node is unchanged
- ◯ Because the line "n1->value = 10" changes the memory referenced by "another_node", while leaving the memory referenced by "a_node" unchanged
- ◯ Because the function f swaps the value fields of the two nodes

4. **Memory used by a pointer must be freed at the end of every function that uses it.** *

Mark only one oval.

- ◯ True
- ◯ False

5. **One way to write a program with no memory leaks is to ensure that the program calls "free" on each pointer (address) returned from "malloc" exactly once.** *

Mark only one oval.

- ◯ True
- ◯ False