

Name: \_\_\_\_\_

## CS 161 Week 7 Worksheet: Pointers and Arrays

### Pointers:

1. What is one difference between pointers and references?

2. Predict the output of this code:

```
short* leaf = new short;
*leaf = -10;
cout << *leaf << endl;

short* tree = new short[4];
tree[0] = *leaf;
tree[1] = *leaf + 1;
tree[2] = tree[0] * 20;
tree[3] = 15 - tree[1];
for (int i=0; i<4; i++) {
    cout << tree[i] << " ";
}
cout << endl;

*tree += 2;
short* rock = &(tree[2]);
cout << *rock << endl;
rock++;
cout << *rock << endl;
```

3. Write a C++ statement that uses `rock` (without changing `rock`) to change `tree[1]` to 15. (Think creatively!)
4. What `delete` statements should come after the above code segment to clean up the heap and avoid memory leaks?
5. What happens if you `delete tree;` instead of `delete [] tree; ?`

## 1-D and Multidimensional Arrays:

1. What error was made in this program? How would you correct it?

```
int* get_ducks() {
    int duck[10] = {};
    duck[3] = 47;
    return duck;
}

int main() {
    int* my_ducks = get_ducks();
    cout << my_ducks[3];
    int goose = 3;
    cout << my_ducks[3];
    return 0;
}
```

2. Define these terms:
  - a. Multi-dimensional array
  - b. Row-major
  - c. Column-major
  - d. Stride
3. Give an example of something from the real world that could be modeled with a multi-dimensional array.
4. Does C++ use row-major or column-major array layout in memory?
5. Static vs. dynamic 2D arrays:
  - a. How do you create each kind?

