Marine Biology Case Study
Worksheet for Part 2, pp 43-48

1. On page 43 in the second paragraph, the author talks about the `Environment` constructor.
    a. How many cells are created by the expression `myWorld(0,0)` in the initializer string? _____

    b. Name the situations that can cause the `cerr` error statement to be displayed?

    _____

    c. The call to `AddFish` has a parameter using the class Position directly. This is similar to a statement used in which other `Environment` function?

    _____

2. Starting in the middle of page 43 the `Display` class is discussed.
    a. the function `ShowMe` converts an ID number to an upper case letter for display. However this only works for the first 26 IDs. Consider modifying `ShowMe` so that after the first 26 IDs, the next 26 IDs are displayed with lowercase letters. In the space below, add code to `ShowMe` so that it does this.

    b. As the author suggests, the coding for the nested for loops is rather complicated. It seems as the the following replacement code for the body of the nested for loops should work.
```
Fish emptyFish;    // place at the top of Show
if (myWorld[r,c] == emptyFish)
{
   cout << setw(WIDTH) << ' ';
}
else
{
   cout << setw(WIDTH) << myWorld[r,c].ShowMe();
}
```
However, it does not. Explain why this will not work.

_____

3. On page 44 in the paragraph after *Stop and Help*, the function `IntToString` in `utils.cpp` is mentioned.

   a. in the first while loop explain in detail what happens for each iteration of the loop if n is 579.

      iteration 1: _____

      iteration 2: _____

      iteration 3: _____

   b. What precisely does the expression `('0' + n%10)` do?

      _____

   c. (AB only) What data structure could have been used to eliminate the need for the for loop which reverses the string?

      _____

4. The function `Sort` in `utils.cpp` uses the Selection sort

   a. If a five element fish list contains
   `(3,2)  (2,3)  (0,4)  (3,4)  (0,0)`
   show the contents of the apvector after the second iteration.

      _____

   b. On another sheet, recode `Sort` using the Insertion sort algorithm and indicate whether you think it will operate significantly slower, significantly faster or about the same as the Selection sort.

      _____

5. At the bottom of page 44 study the code for DebugPrint.

   a. How many spaces is each level of debugging output indented?

      _____

   b. Write the statement which would allow a level 3 debugging message to be displayed each time a new fish is added in AddFish. Have it display both the fish's position and ID. Indicate exactly where your line should be placed within this function.

      _____