**AP Java Marine Biology Simulation**

**Worksheet Ch 2 Pages 41-51**

1. Read the section Testing Programs with Random Behavior on pages 41-42.

2. In which of the clients (SimpleMBSDemo1, SimpleMBSDemo2, MBSGUI) can you set the seed for random number generation? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. At the end of the third paragraph on page 41 the author gives an example of a fish facing south.

a. Where would such a fish have to be within the environment to have only these two options? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. What direction could a fish face and still have the same two options possible?

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c. Where would the fish you noted in the previous question have to be within the environment to only have these two options? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. In the fourth paragraph the author discusses a testing technique where you don’t want to seed the pseudo-random number generator.

a. If you used the same seed, you should get the same result the author describes over a number of trials, but what other result would you also see?

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b. While testing using 10 trials (each a single timestep), you saw that on average the fish moves about 7 times south and 3 times east, what two conclusions can you make (this might be a revision to the original code)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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5. Read the section Black Box Test Cases on pages 42-43.

6. How would you use either SimpleMBSDemo1 or SimpleMBSDemo2 to test the first requirement (no cell should have more than one fish)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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7. Why would it be difficult to use either SimpleMBSDemo1 or 2 to test the second requirement (move to a randomly chosen adjacent empty cell and never move backward)?

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8. On the bottom half of page 42 there are ten testable conditions noted.

a. In the third test, give an example when “the behavior of the fish will depend on its starting location”. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. In the space below, create a test file in which there are four cells but in which the fish cannot move.

c. For the fifth and sixth tests what other true statement can you make about the fish?

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d. In the space below, create a file which demonstrates the seventh test.

e. In the space below, create a file which demonstrates the ninth test

f. If you constructed a file to demonstrate the tenth test and ran that file for 10 trials (one timestep each trial), about how many times should you see the fish move to each of the three adjacent empty locations? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

g. Only with the client MBSGUI can you use a file as input or create an environment to run. What feature of MBSGUI would you need to use in order to see what happens to the fish in any environment you create? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. On page 43 using the environment shown,

a. which fish could be used to test the case for two valid neighboring locations? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. ...three valid neighboring locations? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. If you placed a fish at location (3, 8) what other test of the ten from page 42 would you be able to check for? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. How would you add fish to the environment so that you’d be demonstrating the sixth test (no empty locations around it) using the least number of fish? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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10. Carefully read the section Test Cases Based on Code on page 43.

11. The author describes in the last sentence a situation which would cover the first case in checking the loop. In the space below, create an environment which would test for the second case (which is, it has one neighbor).

12. In dealing with the movement of fish, there are really three distinct methods that are needed. For each of these, describe exactly what set of locations each is dealing with (you might want to look back at pages 36 and 37 to help you out).

environment().neighborsOf(location()); \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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fish.emptyNeighbors() \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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fish.nextLocation() \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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13. On a separate sheet, do the Analysis Questions Set 9 on page 43.

14. Read page 44.

15. Find the documentation for the Debug class at the end of the chapter and write the names of the other methods available. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16. The second paragraph states “All Debug methods are static...” You’ve likely encountered at least one other class in your AP course where the methods are static. Name that class.

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17. On a separate sheet, do the Exercise Set 5 on page 45.

18. Read page 46 and on a separate sheet answer the Analysis Questions Set 10 on page 47.

19. Review the Quick Reference for Core Classes and Interfaces on pp 48-51. This is material you will be responsible to understand. During the APCS test you will be given this information to help you write your answers, so understanding and not memorization is the desired goal.