

Math III

**NEW SEATS!!!**

Sept. 3, 2013

On a separate sheet of paper, answer the following questions:

1. How long did you study for Matrix Test 1 in class?
2. How long did you study outside of class?
3. Do you feel you were prepared for this test? Why or why not?
4. How well do you feel you knew the material?
5. Is there anything you would do differently? Explain.

# AN OKEFENOKEE FOOD WEB

## Learning Task:



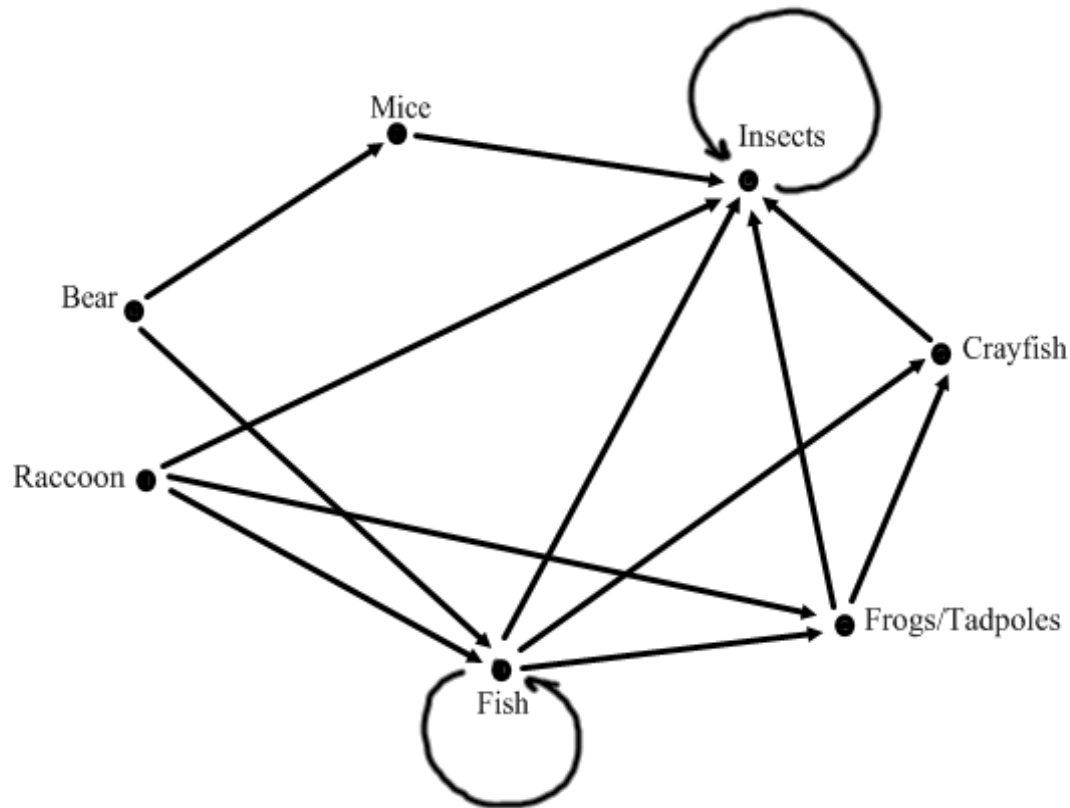
# AN OKEFENOKEE FOOD WEB

## Learning Task:

Recent weather conditions have caused a dramatic increase in the insect population of the Okefenokee Swamp area. The insects are annoying to people and animals and health officials are concerned there will be an increase in disease. Local authorities want to use an insecticide that would literally wipe out the entire insect population of the area. You, as an employee of the Environmental Protection Agency, must determine how detrimental this would be to the environment. Specifically, you are concerned on the effects on the food web of six animals known to populate the swamp.

# AN OKEFENOKEE FOOD WEB Learning Task:

Consider the following digraph of a food web for the six animals and the insects that are causing the problem.

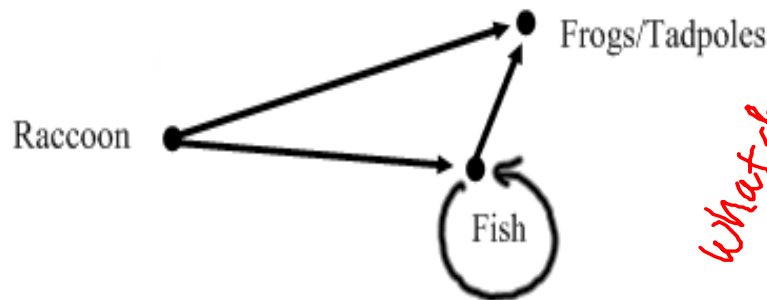


## AN OKEFENOKEE FOOD WEB Learning Task:

- A **digraph** is a directed vertex edge graph. Here each vertex represents an animal or insects. The direction of the edges indicates whether an animal preys on the linked animal. For example, raccoons eat fish. (Note: the food web shown is simplified. Initial producers of nutrients, plants, have not been included.)

# AN OKEFENOKEE FOOD WEB Learning Task:

Adjacency matrices can be used in conjunction with digraphs. If we consider just the relationships between raccoons, fish, and frogs in the food web shown, an adjacency matrix would be



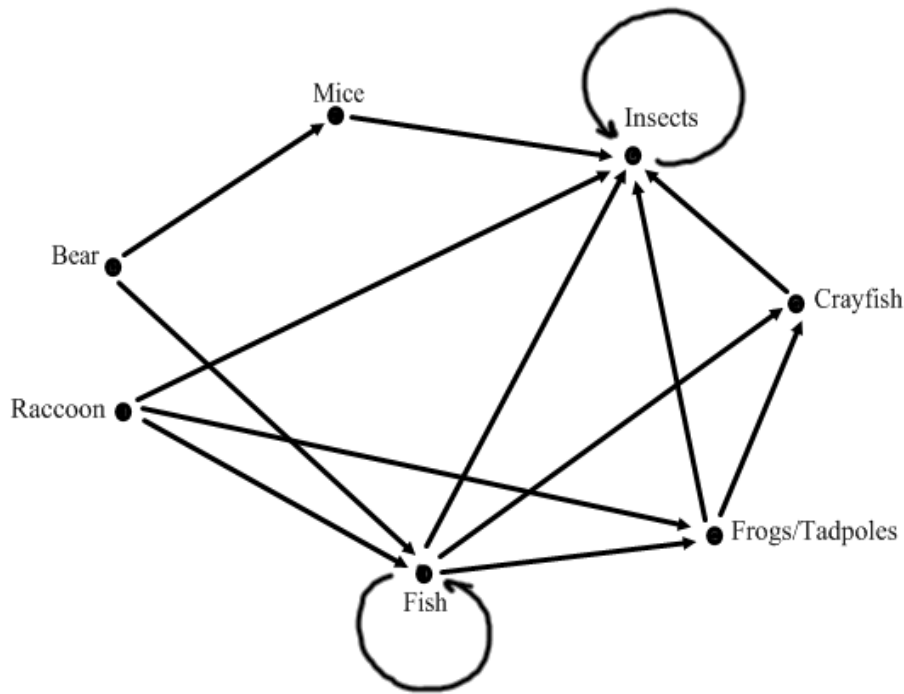
*What does the animal eat?*

*What eats the animal?*

	R	FT	F
R	0	1	1
FT	0	0	0
F	0	1	1

# AN OKEFENOKEE FOOD WEB Learning Task:

1. Construct the associated matrix  $F$  to represent this web.



	B	M	I	C	FT	F	R
B	0	1	0	0	0	1	0
M	0	0	1	0	0	0	0
I	0	0	1	0	0	0	0
C	0	0	1	0	0	0	0
FT	0	0	1	1	0	0	0
F	0	0	1	1	1	1	0
R	0	0	1	0	1	1	0



# AN OKEFENOKEE FOOD WEB Learning Task:

2. What does a row containing a single one indicate?

Only eat 1 other animal

3. What does a column of zeros indicate?

nothing eats that animal

4. Which animals have the most direct sources of food?

Fish How can this be determined from the matrix? most # of 1's in a row

Find the number of direct food sources for each animal.

B-2 M-1 I-1 C-1 FT-2 F-4 R-3

The insect column has the most ones. What does this suggest about the food web? eaten the most

# AN OKEFENOKEE FOOD WEB Learning Task:

5. The matrix  $F^2$  denotes indirect (through one intermediary) sources of food. For example, the fish relies on insects for food, and the bear relies on the fish for food, so the insect is an indirect source of food for the bear. Find  $F^2$ .

	B	M	I	C	FT	F	R
B	0	0	2	1	1	1	0
M	0	0	1	0	0	0	0
I	0	0	1	0	0	0	0
C	0	0	1	0	0	0	0
FT	0	0	2	0	0	0	0
F	0	0	4	2	1	1	0
R	0	0	3	2	1	1	0

# AN OKEFENOKEE FOOD WEB Learning Task:

6. Notice that insect column contains all nonzero numbers. What does this indicate?

*all animals indirectly eat insect.*

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	Dalton	ATL	Macon	Albany	Aug	Way
Dalton	0	1	0	0	0	0