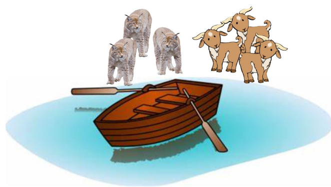

Problem of the Week

Problem B and Solution

Goats in a Boat?

Problem

Three goats and three bobcats want to cross a river from the south side of the river to the north side of the river.

All they have is a small boat which can carry exactly 1, 2 or 3 animals at a time. The problem is that if the bobcats outnumber the goats on either riverbank or in the boat, then bad things will happen to the goats.

Design a set of trips back and forth across the river so that all the animals end up on the north side together and such that the goats are never with more bobcats on either riverbank or in the boat. The table may help to organize your thinking.

Trip	Animals on South Side	In the Boat	Animals on North Side
0	3G, 3B		0
1	2G, 2B	1G, 1B→	1G,1B
2	3G, 2B	←1G	1B
3	2B	3G→	3G, 1B
4	3B	←1B	3G
5	0	3B→	3G, 3B

Solution

The completed table above reveals that the trip can be safely accomplished in 5 crossings, 3 from south to north and 2 return trips north to south. The number of animals on each side are totals after each trip is done.

There are many other solutions. Here is another possibility.

Trip	Animals on South Side	In the Boat	Animals on North Side
0	3G, 3B		0
1	3G, 1B	2B→	2B
2	3G, 2B	←1B	1B
3	1G, 1B	2G, 1B→	2G, 2B
4	2G, 2B	←1G, 1B	1G, 1B
5	1B	2G, 1B→	3G, 2B
6	1G, 1B	←1G	2G, 2B
7	0	1G, 1B→	3G, 3B