



Test Data for Guess Which Cow

Algorithms:

Algorithm 1: Perform a breadth-first search on the question set, where each state is the set of the remaining possible cows.

While this state space sounds like there are 2^{50} possible states, this is not true. The state can also be viewed as the set of possible values for each attribute. There are $2^3 - 1$ values for the set of possible values for each attribute, for a total of less than 2^{24} total states (it is more like $2^{22.5}$ states).

This algorithm runs in $O(N \cdot P \cdot 2^3 \cdot 2^{3P})$ time. It is expected to receive full marks, if implemented well, which may require the use of bit vectors instead of arrays of Boolean values.

Algorithm 2: At each step, select the question which splits the cows most evenly.

This algorithm runs in $O(N \cdot P \cdot 2^3)$ time. It is expected to get around 85% of the points.

Algorithm 3: Ask two questions about each property to determine the exact value, stopping when the cow is known, as well as if you know the property value after the first question about that property.

This algorithm runs very quickly. It is expected to get around 70% of the points.

Algorithm 4: Ask two questions about each property to determine the exact value.

This algorithm runs very quickly. It is expected to get around 45% of the points.



Test Data

Test #	Points	N	P	Min Q's
1	5	10	3	4
2	5	6	4	3
3	5	7	4	3
4	5	8	4	3
5	5	10	4	4
6	5	15	4	4
7	5	16	4	4
8	5	27	3	6
9	5	30	5	6
10	5	40	6	6
11	5	50	7	7
12	5	50	8	7
13	5	50	8	7
14	5	50	4	6
15	5	50	5	6
16	5	50	8	6
17	5	50	4	7
18	5	50	8	6
19	5	17	8	9
20	5	45	8	10

Scoring Methodology:

Optimal question count	100%
1 extra question	80%
2 extra questions	50%
3 to 5 extra questions	40%
More than 5 extra questions	30%