**Data and Analysis for Project 1**

**Design and Algorithms for bot 2, 4, 6 and 9**

**Bot 3/4 Probability Calculations**

For a Probability Matrix containing the probabilities:

where is a cell in the ship at position

When the bot enter cell

* **If the bot does not find the leak in ,** 
  + For cell

(normalize values)

* + For cell
* **If the bot hears a beep in ,**
  + For cell

where

* **If the bot does not hear a beep in ,**
  + For cell

where (Probability we calculated above)

**Bot 8/9 Probability Calculations**

For Knowledge Base containing the probabilities:

where and are pairs of cells in the ship and

When the bot enter cell

* **If the bot does not find the leak in ,** 
  + For any pairs (for j = i)

(normalize values)

* + For any pairs (for j != i)

where ,

and and for all values of in the knowledge base

* **If the bot hears a beep in ,**
  + For any pairs

* **If the bot does not hear a beep in ,**
  + For any pairs

(Probability we calculated above)

Bot 1

Average Action (k={1}, a={0}, runs={10}): 1078.4 per run

Average Action (k={2}, a={0}, runs={10}): 631.3 per run

Average Action (k={3}, a={0}, runs={10}): 559.7 per run

Average Action (k={4}, a={0}, runs={10}): 389.0 per run

Average Action (k={5}, a={0}, runs={10}): 357.9 per run

Bot 2

Average Action (k=1, a=0, runs=10): 1334.8 per run

Average Action (k=2, a=0, runs=10): 846.7 per run

Average Action (k=3, a=0, runs=10): 374.8 per run

Average Action (k=3, a=0, runs=10): 374.8 per run

Average Action (k=5, a=0, runs=10): 212.5 per run

Bot 3

Average Action (k=5, a=0.1, runs=10): 339.3 per run

Average Action (k=5, a=0.15, runs=10): 312.9 per run

Average Action (k=5, a=0.2, runs=10): 122.3 per run

Average Action (k=5, a=0.25, runs=10): 181.9 per run

Average Action (k=5, a=0.3, runs=10): 344.5 per run

Average Action (k=5, a=0.4, runs=10): 380.5 per run

Average Action (k=5, a=0.45, runs=10): 290.0 per run

Average Action (k=5, a=0.5, runs=10): 839.2 per run

Bot 4

Average Action (k=5, a=0.1, runs=10): 413.4 per run

Average Action (k=5, a=0.15, runs=10): 157.1 per run

Average Action (k=5, a=0.25, runs=10): 375.9 per run

Average Action (k=5, a=0.3, runs=10): 429.1 per run

Average Action (k=5, a=0.35, runs=10): 738.7 per run

Average Action (k=5, a=0.4, runs=10): 1537.7 per run

Average Action (k=5, a=0.45, runs=10): 800.4 per run

Average Action (k=5, a=0.5, runs=10): 1348.5 per run

Bot 5

Average Action (k=1, a=0, runs=10): 2021.7 per run

Average Action (k=2, a=0, runs=10): 1408.5 per run

Average Action (k=3, a=0, runs=10): 847.3 per run

Average Action (k=4, a=0, runs=10): 566.2 per run

Average Action (k=5, a=0, runs=10): 507.7 per run

Bot 6

Average Action (k=1, a=0, runs=10): 2359.8 per run

Average Action (k=2, a=0, runs=10): 868.3 per run

Average Action (k=3, a=0, runs=10): 574.7 per run

Average Action (k=4, a=0, runs=10): 559.1 per run

Average Action (k=5, a=0, runs=10): 404.1 per run