**Binary 1**

| odd10 | even10 | odd100 | even100 | odd1000 | even1000 |

-----------------------------------------------------------------------------------------------------------|

Test Binary 1 | 4.400 | 4.400 | 7.700 | 7.750 | 10.979 | 10.975 |

-----------------------------------------------------------------------------------------------------------|

Theoretical R | 4.400 | 4.400 | 7.640 | 7.640 | 10.965 | 10.965

The test results of the binary 1 search closely match the theoretical calculations of average work at all values of n. The average successful / unsuccessful calculations were calculated using the following formulas:

Since the average work formula in that table is an approximation, so it doesn't work for small values of n. I calculated these using a study of the decision tree. For n=10 I found that:

(2[leaves]\*5[level of these leaves] + 3\*4 + 2\*5 + 3\*4)\*(1/10) = 44/10 = **4.4.**

The larger values of n, 100 and 1000, were calculated using the formula:

1+log2n

**Binary 2**

| odd10 | even10 | odd100 | even100 | odd1000 | even1000 |

-----------------------------------------------------------------------------------------------------------|

Test Binary 2 | 4.800 | 7.000 | 10.340 | 13.460 | 17.078 | 19.968 |

-----------------------------------------------------------------------------------------------------------|

Theoretical R | 4.800 | 7.100 | 10.287 | 13.287 | 16.931 | 19.931 |

successful / unsuccessful calculations were calculated using the following formulas:

Since the average work formula in that table is an approximation, so it doesn't work for small values of n. I calculated these using a study of the decision tree. For n=10 I found that:

2\*19 + 1\*10 = 48, and each case has probability 1/10, giving average work of **4.8**.

The larger values of n, 100 and 1000, were calculated using the formulas:

Successful: (2\*log2n)-3

Unsuccessful: 2\*log2n

**Sequential Search**

| odd10 | even10 | odd100 | even100 | odd1000 | even1000 |

-----------------------------------------------------------------------------------------------------------|

Sequential | 5.500 | 10.000 | 51.860 | 100.000 | 503.278 | 1000.000 |

-----------------------------------------------------------------------------------------------------------|

Theoretical R | 5.500 | 10.000 | 50.500 | 100.000 | 505.500 | 1000.000 |

-----------------------------------------------------------------------------------------------------------|

The test results of the Sequential search closely match the theoretical calculations of average work. The average successful / unsuccessful calculations were calculated using the following formulas:

Average Successful: ½(n+1)

Average Unsuccessful: n

There are slight discrepancies in the 100 and 1000 sized results. I believe these discrepancies were the result of repeated key values in the random data set.

**Short Sequential Search**

| odd10 | even10 | odd100 | even100 | odd1000 | even1000 |

-----------------------------------------------------------------------------------------------------------|

S-Sequential | 6.500 | 6.500 | 52.860 | 51.330 | 504.278 | 482.832 |

-----------------------------------------------------------------------------------------------------------

Theoretical R | 6.500 | 6.818 | 51.500 | 51.980 | 501.500 | 501.998 |

-----------------------------------------------------------------------------------------------------------|

The test results of the Short Sequential search closely match the theoretical calculations of average work. The average successful / unsuccessful calculations were calculated using the following formulas:

Average Successful: ½(n+1)+1

Average Unsuccessful: n[(n+5)/(2(n+1))]

There are slight discrepancies in the 100 and 1000 sized results. I believe these discrepancies were the result of repeated key values in the random data set.