Matthew Olsen

CSE 122: HW 3

March 5, 2016

Homework 3

|  |  |  |
| --- | --- | --- |
| **line** | **Cost** | **# of Times** |
| 1 | C1 | n - 6 |
| 2 | C2 | n - 7 |

T(n) = n(C1 + C2) – 6C­6 – 7C2

Big-O: O(n)

|  |  |  |
| --- | --- | --- |
| **line** | **Cost** | **# of Times** |
| 1 | C1 | 1 |
| 2 | C2 | 1 |
| 3 | C3 | 1 |

T(n) = C1 + C2 + C3

Big-O: O(1)

|  |  |  |
| --- | --- | --- |
| **line** | **Cost** | **# of Times** |
| 1 | C1 | n |
| 2 | C2 | n - 1 |
| 3 | C3 |  |
| 4 | C4 |  |
| 5 | C5 | n - 1 |

T(n) = ½n2(C3 + C4)+n(C1 + C2 + ½C3 – ½C4 + C5) – C2 – C3 – C5

Big-O: O(n2)

|  |  |  |
| --- | --- | --- |
| **line** | **Cost** | **# of Times** |
| 1 | C1 | n + 1 |
| 2 | C2 |  |
| 3 | C3 |  |
| 4 | C4 |  |

T(n) = 1/6\*n3(C3 + C4)+n2(½C2 + ½C3 + C4)+n(C1 + ½C2 + 1/3\*C3 + 5/6\*C4) + C1 + ½C2

Big-O: O(n3)

Work:

Lines 1 and 2 were calculated using the same methods from questions 1 – 3.

Lines three and four were calculated via the use of a table I had set up below:

|  |  |  |  |
| --- | --- | --- | --- |
| **i value** | **j for** | **k for** | **k body** |
| 1 | 2 | 2 | 1 |
| 2 | 3 | 2 + 3 | 1 + 2 |
| 3 | 4 | 2 + 3 + 4 | 1 + 2 + 3 |
| … | … |  | … |
| n | n + 1 | 2 + 3 + … + n + (n + 1) | 1 + 2 + … + n |

Line 3 can be converted into the form. This was then converted, using Wolfram alpha, to the form.

Line 4 can be converted into the form. This was then converted, using Wolfram alpha, to the form.

1. If , then in is equal to and is equal to .

**Permutations:**

begin lucky run

run n time

1 250 0.0008

2 250 0.0012

3 250 0.0006

4 250 0.0007

5 250 0.0008

6 250 0.0006

7 250 0.0005

8 250 0.0005

9 250 0.0005

10 250 0.0007

avg for n = 250 for lucky is 0.0007 seconds

run n time

1 500 0.0020

2 500 0.0030

3 500 0.0026

4 500 0.0022

5 500 0.0031

6 500 0.0024

7 500 0.0023

8 500 0.0022

9 500 0.0022

10 500 0.0021

avg for n = 500 for lucky is 0.0024 seconds

run n time

1 1000 0.0116

2 1000 0.0106

3 1000 0.0102

4 1000 0.0090

5 1000 0.0087

6 1000 0.0102

7 1000 0.0102

8 1000 0.0147

9 1000 0.0092

10 1000 0.0089

avg for n = 1000 for lucky is 0.0103 seconds

run n time

1 2000 0.0493

2 2000 0.0433

3 2000 0.0413

4 2000 0.0539

5 2000 0.0520

6 2000 0.0428

7 2000 0.0375

8 2000 0.0471

9 2000 0.0407

10 2000 0.0506

avg for n = 2000 for lucky is 0.0459 seconds

begin used run

run n time

1 2500 0.0003

2 2500 0.0003

3 2500 0.0003

4 2500 0.0002

5 2500 0.0003

6 2500 0.0003

7 2500 0.0003

8 2500 0.0003

9 2500 0.0003

10 2500 0.0003

avg for n = 2500 for used is 0.0003 seconds

run n time

1 5000 0.0006

2 5000 0.0007

3 5000 0.0006

4 5000 0.0010

5 5000 0.0010

6 5000 0.0006

7 5000 0.0008

8 5000 0.0007

9 5000 0.0006

10 5000 0.0006

avg for n = 5000 for used is 0.0007 seconds

run n time

1 10000 0.0016

2 10000 0.0015

3 10000 0.0013

4 10000 0.0020

5 10000 0.0015

6 10000 0.0013

7 10000 0.0017

8 10000 0.0012

9 10000 0.0016

10 10000 0.0014

avg for n = 10000 for used is 0.0015 seconds

run n time

1 20000 0.0045

2 20000 0.0025

3 20000 0.0027

4 20000 0.0031

5 20000 0.0029

6 20000 0.0027

7 20000 0.0034

8 20000 0.0030

9 20000 0.0027

10 20000 0.0030

avg for n = 20000 for used is 0.0031 seconds

run n time

1 40000 0.0068

2 40000 0.0070

3 40000 0.0082

4 40000 0.0071

5 40000 0.0060

6 40000 0.0067

7 40000 0.0070

8 40000 0.0056

9 40000 0.0061

10 40000 0.0063

avg for n = 40000 for used is 0.0067 seconds

run n time

1 80000 0.0159

2 80000 0.0202

3 80000 0.0129

4 80000 0.0150

5 80000 0.0132

6 80000 0.0183

7 80000 0.0184

8 80000 0.0147

9 80000 0.0137

10 80000 0.0165

avg for n = 80000 for used is 0.0159 seconds

begin knuth run

run n time

1 1000 0.0000

2 1000 0.0000

3 1000 0.0000

4 1000 0.0000

5 1000 0.0000

6 1000 0.0000

7 1000 0.0000

8 1000 0.0000

9 1000 0.0000

10 1000 0.0000

avg for n = 1000 for knuth is 0.0000 seconds

run n time

1 2000 0.0000

2 2000 0.0000

3 2000 0.0000

4 2000 0.0000

5 2000 0.0000

6 2000 0.0000

7 2000 0.0000

8 2000 0.0000

9 2000 0.0000

10 2000 0.0000

avg for n = 2000 for knuth is 0.0000 seconds

run n time

1 4000 0.0001

2 4000 0.0001

3 4000 0.0001

4 4000 0.0001

5 4000 0.0001

6 4000 0.0001

7 4000 0.0001

8 4000 0.0001

9 4000 0.0001

10 4000 0.0001

avg for n = 4000 for knuth is 0.0001 seconds

run n time

1 8000 0.0001

2 8000 0.0001

3 8000 0.0002

4 8000 0.0002

5 8000 0.0002

6 8000 0.0002

7 8000 0.0002

8 8000 0.0002

9 8000 0.0002

10 8000 0.0002

avg for n = 8000 for knuth is 0.0001 seconds

run n time

1 16000 0.0003

2 16000 0.0003

3 16000 0.0003

4 16000 0.0003

5 16000 0.0003

6 16000 0.0003

7 16000 0.0003

8 16000 0.0003

9 16000 0.0003

10 16000 0.0003

avg for n = 16000 for knuth is 0.0003 seconds

run n time

1 32000 0.0006

2 32000 0.0006

3 32000 0.0006

4 32000 0.0006

5 32000 0.0006

6 32000 0.0006

7 32000 0.0006

8 32000 0.0006

9 32000 0.0006

10 32000 0.0006

avg for n = 32000 for knuth is 0.0006 seconds

run n time

1 64000 0.0013

2 64000 0.0012

3 64000 0.0012

4 64000 0.0012

5 64000 0.0012

6 64000 0.0012

7 64000 0.0012

8 64000 0.0017

9 64000 0.0015

10 64000 0.0012

avg for n = 64000 for knuth is 0.0013 seconds