## CSCE 221-200: Honors Data Structures and Algorithms Assignment Cover Page Spring 2021

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| **Assignment:** | Homework 1 |
| **Grade (filled in by grader):** |  |

Please list below all sources (people, books, webpages, etc) consulted regarding this assignment (use the back if necessary):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CSCE 221 Students** | **Other People** | **Printed Material** | **Web Material (give URL)** | **Other Sources** |
| 1. | 1. | 1. The Textbook | 1. https://stackoverflow.com/questions/18466309/recursion-counter-inside-a-c-function | 1. |
| 2. | 2. | 2. | 2. https://www.programiz.com/cpp-programming/recursion | 2. |
| 3. | 3. | 3. | 3. http://www.cplusplus.com/reference/string/to\_string/ | 3. |
| 4. | 4. | 4. | 4. https://www.instructables.com/How-to-Convert-Numbers-to-Binary/ | 4. |
| 5. | 5. | 5. | 5. https://stackoverflow.com/questions/33194931/when-can-an-algorithm-have-square-rootn-time-complexity#:~:text=6%20Answers&text=Square%20root%20time%20complexity%20means,which%20takes%20that%20much%20time. | 5. |
|  |  |  | https://www.google.com/search?q=min+to+ms&rlz=1C1RXQR\_enUS931US931&oq=min+to+ms&aqs=chrome..69i57j6j0l4.5890j1j7&sourceid=chrome&ie=UTF-8 |  |
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"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work. In particular, I certify that I have listed above all the sources that I consulted regarding this assignment, and that I have not received or given any assistance that is contrary to the letter or the spirit of the collaboration guidelines for this assignment."

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| **Signature:** | Priyanshu Barnwal |
| **Date:** | 1/24/2021 |

#include <iostream>

#include <string>

#include <cmath>

using namespace std;

int power\_two(int num) {

int last = 0;

int rem = num % 2;

last += rem;

if (num != 1)

last += (power\_two(num / 2)\*10);

return last;

}

Exercise 2.7a:

1. O(n)
2. O(n^2)
3. O(n^3)
4. O(n^2)
5. O(n^3)
6. O(n^4)

Exercise 2.12:

1. 12 million
2. 3,656,807.36
3. 34641.02
4. 4932.42

Exercise 2.20:

1. bool prime(int x) {

for (int n = 2; n < x / 2; n++)

if (x % n == 0)

return false;

return true;

}

1. O(N) is the worst case run time because there is a for loop. I am not sure how to lower this.
2. O(log2(N))
3. 2B/2
4. T2 and T3
5. In terms of B because it is more accurate.

Exercise 2.23:

long long power(long long x, int n) {

int number = x;

if (n == 0) {

return 1;

}

if (n == 1) {

return x;

}

if (n % 2 == 0)

for (int i = 0; i < n / 2; i++)

x \*= x;

else {

for (int i = 0; i < n / 2; i++) {

cout << n << endl;

x \*= x;

}

x \*= number;

}

return x;

}