CS 206   Data Structures   Spring 2017

Homework 3

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1. If S is a set of n element, the power set of S is the set of all possible subsets of S. For example, if S = {a, b, c}, then `powerset(S)` = {{}, {a}, {b}, {c}, {a,b}, {a,c}, {b,c}, {a,b,c}}. Write in pseudocode a recursive function to compute `powerset(S)`.

2. Why is the order of an algorithm generally more important than the speed of the processor?

3. Convert each time formula to the best possible big-O notation. Do not include any spurious constants in your big-O answer.

Time Formula	Big-O
10n	.
$2n^2$	.
3 times log (base 2) of n	.
$2n^2 + 10n$	.

5. What will be the big-O expression for $1+2+3+...+n$?

6. What formula in big-O notation will represent the expression $n^2+35n+6$?

7. Here is some code for an *integer* variable n:

```
while (n > 0)
{
    n = n/10; // Use integer division
}
```

What is the worst-case time analysis for the above loop?

8. Express the formula $(n - 2)*(n - 4)$ using the big-O notation.

9. Write a program containing a recursive function that prints out the sequence of moves needed to accomplish the task of the Towers of Hanoi problem discussed in class.