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Mathematical Analysis of Algorithms

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**Homework #2**

**Due Date:**

**Reading Assignment:** 2.3-2.7

**Problems:**

1. 2-15

2. 2-21

3. 2-24

4. Evaluate  $\sum_{1 \leq k \leq 2^n - 1} k \lfloor \lg k \rfloor$

5. Consider the expansion

$$\begin{aligned} & (1 - a)(1 - b)(1 - c)(1 - d) \cdots \\ & = 1 - a - b + ab - c + ac + bc - abc - d + \cdots . \end{aligned}$$

Let  $a_0, a_1, a_2, a_3, \dots$  denote the terms  $1, -a, -b, +ab, \dots$ . What is the sign of the  $a_n$ ?

(**Hint:** the answer has something to do with the number of ones in the binary expansion of  $n$ .)

6. 3-40(a)