

Recitation 4 & 5

Practiced on: 1/31 & 2/2 5:30 - 6:20 pm

Integers and Algorithm

Note: These problems are designed for practice during a 50 minute recitation.

- a) **Easy** problems: expected to be solved in *5 min*.
- b) **Medium** problems: expected to be solved in *30 min*.
- c) **Hard** problems: expected to be solved in *15 min*.

During the recitation, you may discuss the problems with your peers and the TA. Please control your volume and don't annoy others. An electronic copy of these problems and solutions will be posted on the following URL: <http://cs.utsa.edu/~btang/pages/teaching.html>.

Problems:

1. (3 min) Convert these integers from decimal notation to binary notation. (Textbook [KR] Page 229: 1 a & b)
 - a) 231.
 - b) 4532.
2. (2 min) Convert these integers from hexadecimal notation to binary notation. (Textbook [KR] Page 229: 5 a & b)
 - a) 80E.
 - b) 135AB.
3. (10 min) Use *Algorithm 5* to find $7^{644} \bmod 645$. (Textbook [KR] Page 230: 19, hint: Page 226-227)
4. (10 min) Use the Euclidean algorithm to find: (Textbook [KR] Page 230: 23 e & f)
 - a) $\gcd(1000, 5040)$.
 - b) $\gcd(9888, 6060)$.
5. (10 min) Multiply $(1110)_2$ and $(1010)_2$ by working through each step of the algorithm for multiplication given in the text. (Textbook [KR] Page 231: 50, Hint: Page 224-225)
6. (15 min) How many bit operations does the comparison algorithm from Exercise 53 use when the larger of a and b has n bits in its binary expansion? (Textbook [KR] Page 231: 54, hint: use the algorithm given in the answers section, page S-22, of the textbook)

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