ICS – Maths Revision

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School of BEI Study Skills in Mathematics

http://moodle.bbk.ac.uk/

http://www.dcs.bbk.ac.uk/~sjmaybank/introduction%20to%20computer%20systems.html
Learning Objectives

• Boolean operations, truth tables
• BIN conversion
• BIN addition/multiplication
• 2’s complement notation
• Excess notations
• BIN fractions
• Normalization
• Floating point notation
• HEX and BIN
Basic Boolean Operations

What are the basic Boolean operations?

What do you know about them?
Truth Table

What is a truth table?

How do you construct one?

What are the key steps when constructing one?
Example 1

(A AND B) OR NOT(B)
Example 2

\((\text{NOT}(B) \lor A) \land C\)
Evaluating Boolean Expressions

Which operations are used, how do they work?

What are the priorities?

What values do I know?

Is there any value I don’t know?
Example 1

Evaluate the value of the following Boolean expression, if $A = 1$ and $B = 0$

$A \text{ AND NOT}(B)$
Example 2

Evaluate the value of the following Boolean expression, if $A = 1$ and $B = 0$

$(A \lor \neg B) \oplus C$
BIN to DEC

Place values

10110101

1101101

How do you carry out the conversion step-by-step?
How do you carry out the conversion step-by-step?
BIN Addition

Addition rules:
0 + 0 = 0
1 + 0 = 1
0 + 1 = 1
1 + 1 = 0 carry 1
1 + 1 + 1 = 1 carry 1
BIN Addition

Example 1:
10101 + 110 =

Example 2:
11100 + 11110 =

Addition rules:
0 + 0 = 0
1 + 0 = 1
0 + 1 = 1
1 + 1 = 0 carry 1
1 + 1 + 1 = 1 carry 1
BIN Multiplication

Example 1:
1101 \times 101 =

Example 2:
110101 \times 110 =
2’s Complement Notation

<table>
<thead>
<tr>
<th>6 bits two’s complement</th>
<th>4 bits two’s complement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1: -6</td>
<td>Example 2: -3</td>
</tr>
<tr>
<td>1001</td>
<td>0110</td>
</tr>
</tbody>
</table>

What is the step-by-step process for solving these problems?
# Excess Notation

<table>
<thead>
<tr>
<th>4 bits excess:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1:</td>
<td>Example 2:</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Example 3:</td>
<td>Example 4:</td>
</tr>
<tr>
<td>- 5</td>
<td>- 4</td>
</tr>
</tbody>
</table>
BIN Fractions

Example 1:

110.101

Example 2:

101.1101

What is the step-by-step process for solving this problem?
## BIN Fractions

**Example 3:**

\[3 \frac{1}{4}\]

**Example 4:**

\[5 \frac{3}{4}\]

What is the step-by-step process for solving this problem?
Scientific Notation

Example 1:
3200000

Example 2:
0.000000047
### Normalization

**Example 1:**  $0.0011001$

<table>
<thead>
<tr>
<th>Exponent</th>
<th>Mantissa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example 2:**  $101.10010$

<table>
<thead>
<tr>
<th>Exponent</th>
<th>Mantissa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Floating Point Notation

What does this sequence mean?
What is s?
What are e1e2e3?
What are m1m2m3m4?
Floating Point Notation

Example 1:  
-3 \(\frac{1}{4}\)

Example 2:  
-5 \(\frac{3}{8}\)

What is the step-by-step process for solving this problem?
Floating Point Notation

Example 3:  10101101
Example 4:  01011100

What is the step-by-step process for solving this problem?
Hexadecimal

What are the hexadecimal digits?

Every HEX digit has a 4 bits BIN equivalent, e.g.:
0
7
B
Hexadecimal

Example 1:   3E

Example 2:   B2A

Example 3:   11000011

Example 4:   10001010
Any Questions?
• Should you have any further questions about this topic, please contact Eva, the Maths Learning Support Officer on: 0207 631 6254
  Or
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  GOOD LUCK