

CSSE 132 – Introduction to Computer Systems  
 Rose-Hulman Institute of Technology  
 Computer Science and Software Engineering Department

## Homework 2

Write your answers on a separate sheet of paper. Be sure to show your work.

1. (10 points) Write the truth table for each expression.

(a)  $R = AB + \overline{A}\overline{B}$

(b)  $R = AB(C + \overline{A}) + \overline{B}(A + \overline{C})$

2. (10 points) Write the expression for each truth table.

(a)

A	B	R
0	0	1
0	1	1
1	0	0
1	1	1

(b)

A	B	C	R
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

3. (5 points) Draw the circuit for the expressions. You may use AND, OR, and NOT gates. Do not simplify the expressions or the circuit.

(a)  $R = AB + \overline{A}\overline{B}$

(b)  $R = A\overline{B}\overline{C} + AC + C$

4. (10 points) Write the truth table for a full 1 bit adder. Your adder should accept inputs  $A, B, C_{in}$  and produce outputs  $R, C_{out}$ .
5. (10 points) Write the circuit for a full 1 bit adder. You may only use AND, OR, and NOT gates.

6. (15 points) Given the bit pattern  
10101101000100000000000000000011  
what value does it represent in decimal (base 10), assuming that it is
- (a) a two's complement integer?
  - (b) an unsigned integer?
7. (5 points) Simplify this boolean expression. Be sure to clearly show your work and the transition between each step.

$$R = ABC\bar{C} + \bar{A}(\bar{C} + A)\bar{B}(\bar{C} + \bar{A})$$

8. (10 points) Open a web browser and go to the bandit instruction page (linked here and on moodle). Follow the instructions and get into level 5. *Submit the passwords you discover to moodle in the "Homework 2 Bandit" quiz* – do not write them on your homework submission.  
<http://overthewire.org/wargames/bandit/>