

CS31 Worksheet: Week 3 Digital Circuits

Q1.

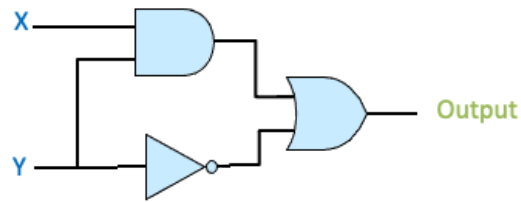
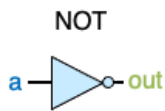
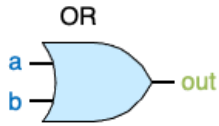
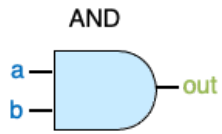
```
#include <stdio.h>

void count_predictions(char predictions[], int n, char eagles, char rams, char
no_winner);

void count_predictions(char predictions[], int n, char eagles, char rams, char
no_winner) {
    int eagle_votes = 0;
    int rams_votes = 0;
    int nowin_votes = 0;
    for (int i = 0; i < n; i++) {
        if (predictions[i] == eagles) {
            eagle_votes++;
        } else if (predictions[i] == rams) {
            rams_votes++;
        } else { nowin_votes++; }
    } -----> DRAW STACK DIAGRAM HERE
    printf("%d predicted Eagles would win.\n", eagle_votes);
    printf("%d predicted Rams would win.\n", rams_votes);
    printf("%d predicted that there would be no winner.\n", nowin_votes);
}

int main() {
    char eagles = 'E';
    char rams = 'R';
    char no_winner = 'X';
    char predictions[10] = {eagles, eagles, no_winner, eagles,
                            rams, no_winner, eagles, rams, eagles,
                            no_winner};
    count_predictions(predictions, 10, eagles, rams, no_winner);
    return 0;
}
```

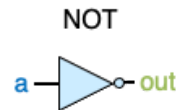
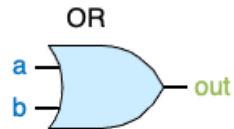
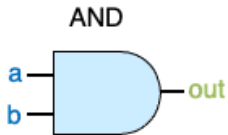
Q2. What does this circuit output?



Clicker Choices

X	Y	Out _A	Out _B	Out _C	Out _D	Out _E
0	0	0	1	0	1	0
0	1	0	1	0	0	1
1	0	1	0	1	1	1
1	1	0	0	1	1	0

Q3. Using AND, OR and NOT gates, draw out an XOR Circuit



A	B	A ^ B
0	0	0
0	1	1
1	0	1
1	1	0

Q4. Given the following truth table, draw out a one-bit adder.

A	B	Sum (A + B)	C _{out}
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Q5. Let's now draw out a one-bit full adder

Write Boolean expressions
for $Sum = 1$ and $C_{out} = 1$

A	B	C_{in}	Sum	C_{out}
0	0	0	0	0
0	1	0	1	0
1	0	0	1	0
1	1	0	0	1
0	0	1	1	0
0	1	1	0	1
1	0	1	0	1
1	1	1	1	1

When is Sum 1?

When is C_{out} 1?

Q6. Which of these circuits lets us select between two inputs?

