

LOGIC



\$1.85

**INTRODUCTION TO
SYMBOLIC LOGIC
AND
ITS APPLICATIONS**

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A Dover Book

$$p \rightarrow q$$

$$\neg \rightarrow \leftrightarrow \wedge \vee$$

$\Rightarrow \Leftrightarrow$

E A

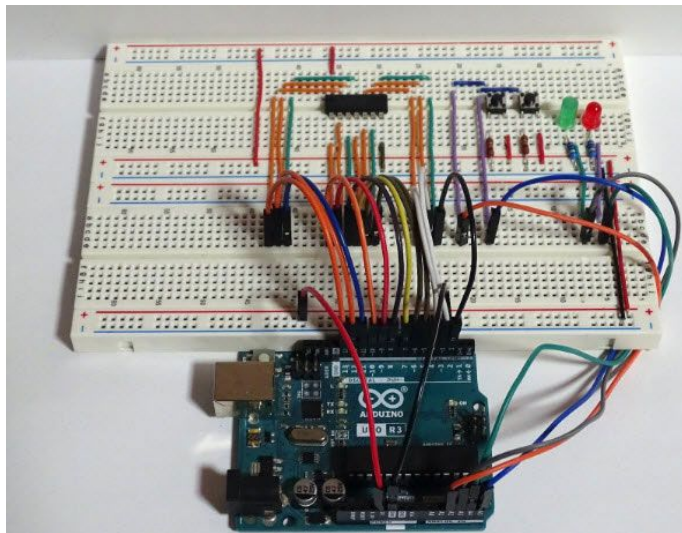
$$(\forall x)(P(x) \rightarrow Q(x))$$

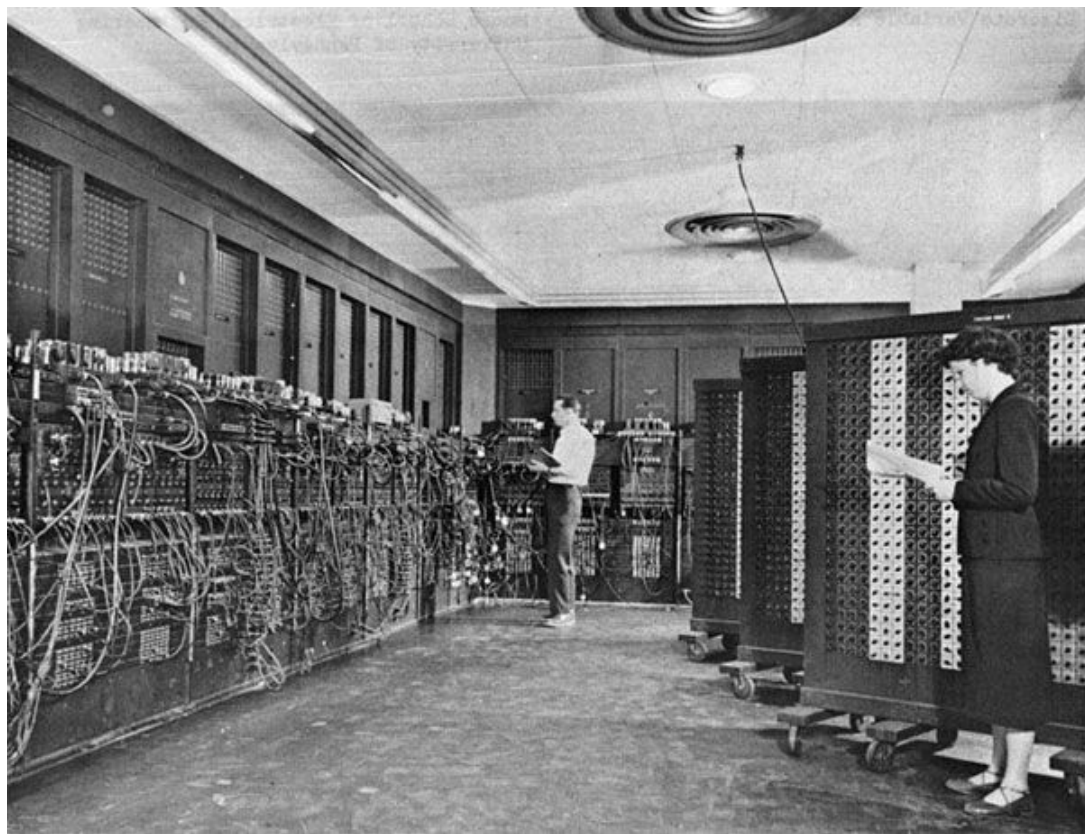
$$(\exists x) \neg (P(x) \rightarrow Q(x))$$

$$(\exists x)(P(x) \wedge \neg Q(x))$$

P	Q	R	$P \rightarrow Q$	$Q \rightarrow R$	$(P \rightarrow Q) \wedge (Q \rightarrow R)$
T	T	T	T	T	T
T	T	F	T	F	F
T	F	T	F	T	F
T	F	F	F	T	F
F	T	T	T	T	T
F	T	F	T	F	F
F	F	T	T	T	T
F	F	F	T	T	T

□





AND Truth Table

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

OR Truth Table

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

XOR Truth Table

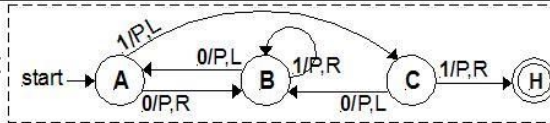
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

NOT Truth Table

A	B
0	1
1	0

```
if(x){print(x)}
```

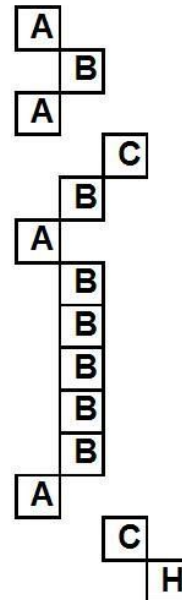
3-state busy beaver:



Total system state --
complete configuration (aka
"instantaneous description")
TAPE & TABLE & HEAD

Sequence	Instruction	Head															
1	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	A	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
4	C	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
5	B	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
6	A	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
7	B	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0
8	B	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
9	B	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0
10	B	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0
11	B	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0
12	A	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
13	C	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0
14	H	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0

time -->



A 0
B 0 1
1 A 1
1 1 C 0
1 1 1 B 0
1 1 1 1 A 0
1 1 1 1 B 1 1
1 1 B 1 1 1
1 B 1 1 1 1
B 1 1 1 1 1
B 0 1 1 1 1 1
1 A 1 1 1 1 1
1 1 C 1 1 1 1
1 H 1 1 1 1 1

Progress of the computation (state-trajectory) of a 3-state busy beaver

```
boolean y = true;
```

```
if(y){
```

```
print(y);
```

```
}
```

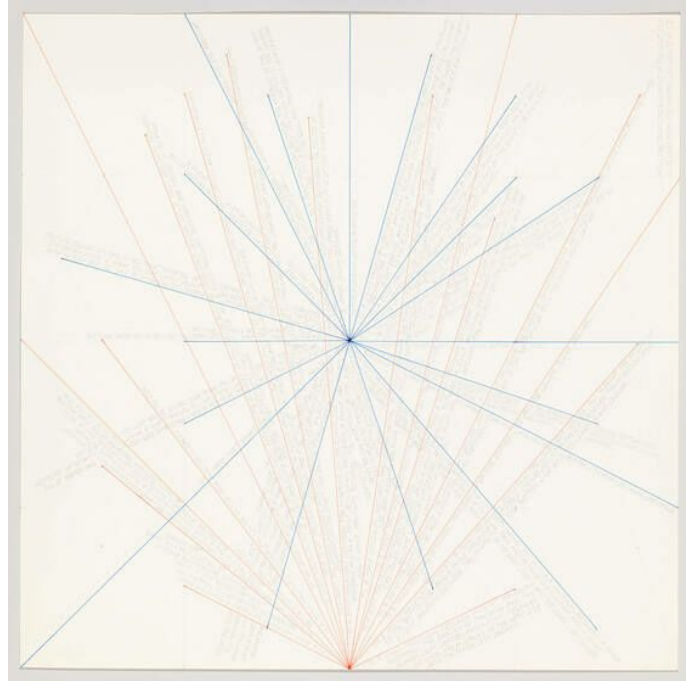
```
Console: true
```

```
int a = 1;
int b = 2;
int c = 3;

boolean y = true;

if(a < b && a < c){
float d = c * b;
    if(d * 0.5 == c){
        print(d, y);
    }
} else if (a > c){
    print(!y);
}
```

Console: 6.0 true

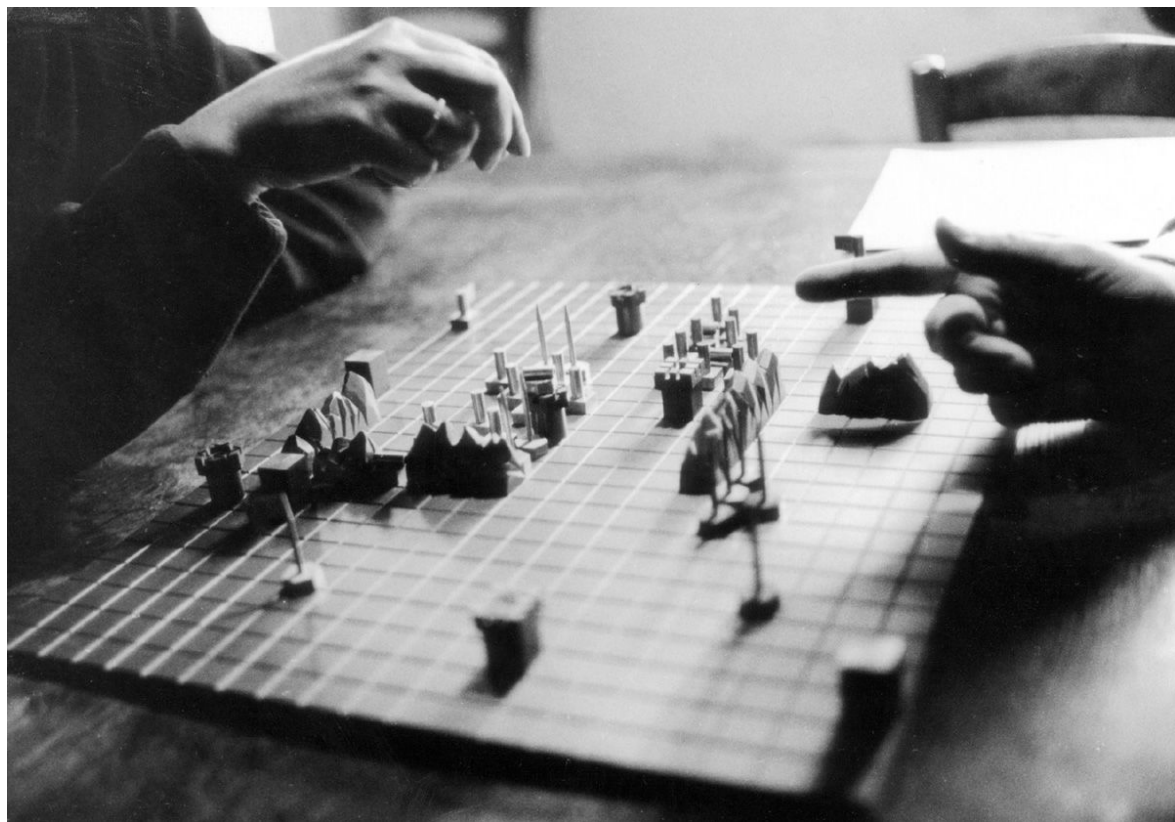




Robert Rauschenberg
Black and White (1965)
Oil on paper, 100 x 100 cm
Edition 1/100

Robert Rauschenberg (1925-2008) was an American visual artist, painter, and photographer. He is known for his work in the Color Field movement and for his innovative use of color and texture. His work often explores the relationship between the visible and the invisible, the physical and the conceptual. Rauschenberg's 'Black and White' (1965) is a prime example of his mastery of color and texture, featuring a dark, textured square center surrounded by a light, textured border.





Homework: create a simple interactive program using arithmetic, nested if statements, and multiple data types.