

CP220 PHASE II
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Equations

Table

Digit	a3a2a1a0	Digit of Pi	b3b2b1b0
0	0000	3	0011
1	0001	1	0001
2	0010	4	0100
3	0011	1	0001
4	0100	5	0101
5	0101	9	1001
6	0110	2	0010
7	0111	6	0110
8	1000	5	0101
9	1001	3	0011

Master Table

a3	a2	a1	a0	b3	b2	b1	b0
0	0	0	0	0	0	1	1
0	0	0	1	0	0	0	1
0	0	1	0	0	1	0	0
0	0	1	1	0	0	0	1
0	1	0	0	0	1	0	1
0	1	0	1	1	0	0	1
0	1	1	0	0	0	1	0
0	1	1	1	0	1	1	0
1	0	0	0	0	1	0	1
1	0	0	1	0	0	1	1

B0 Truth Table

a3	a2	a1	a0	b0
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1

B0 Karnaugh Map

b0	a1a0				
a3a2		00	01	10	11
00	1	1	0	1	
01	1	1	0	0	
10	1	1	0	0	
11	0	0	0	0	

B0 SOP

$$\begin{aligned} B0 = & (a0') (a1') (a2') (a3') + (a0) (a1') (a2') (a3') + (a0) (a1) (a2') (a3') + (a0') (a1') (a2) (a3') + (a0) \\ & (a1') (a2) (a3') + (a0') (a1') (a2') (a3) + (a0) (a1') (a2') (a3) + (a0') (a1) (a2') (a3) \end{aligned}$$

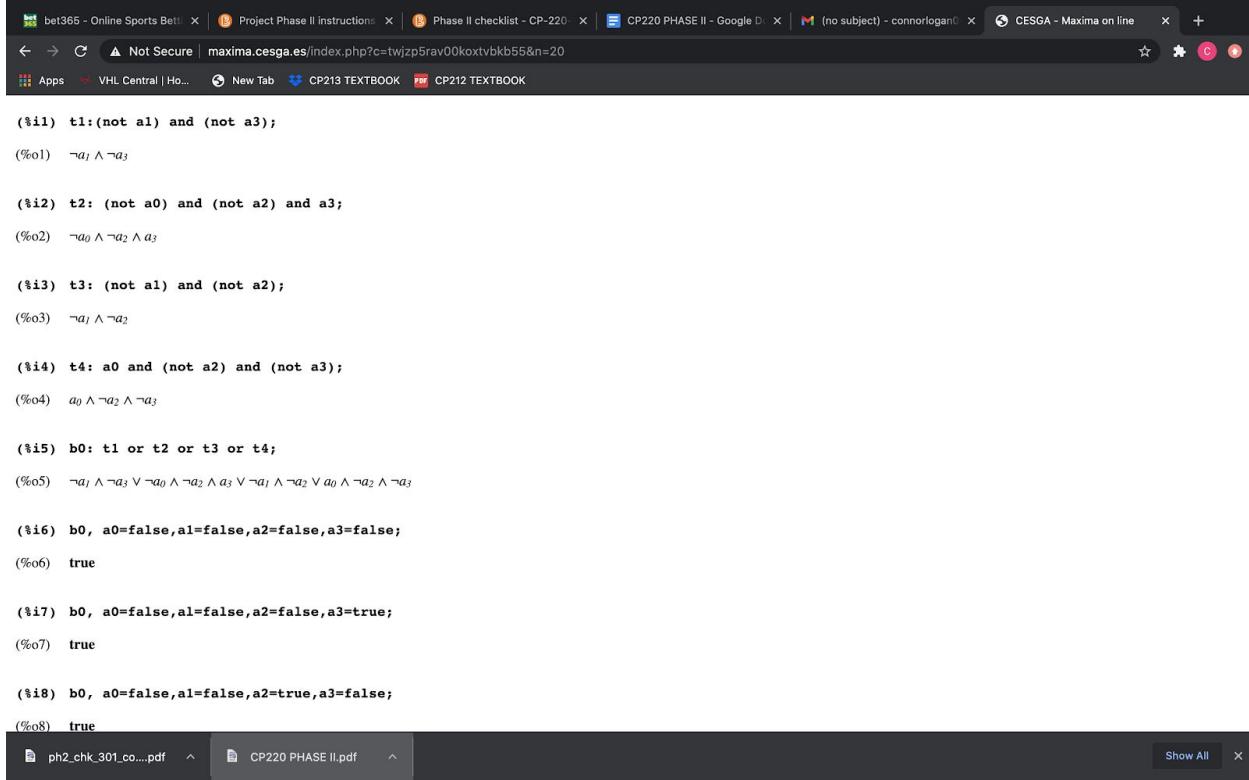
B0 Maxima

Code (with screen caps)

```
t1:(not a1) and (not a3);
t2: (not a0) and (not a2) and a3;
t3: (not a1) and (not a2);
t4: a0 and (not a2) and (not a3);
b0: t1 or t2 or t3 or t4;

b0, a0=false,a1=false,a2=false,a3=false;
b0, a0=false,a1=false,a2=false,a3=true;
b0, a0=false,a1=false,a2=true,a3=false;
b0, a0=false,a1=false,a2=true,a3=true;
b0, a0=false,a1=true,a2=false,a3=false;
b0, a0=false,a1=true,a2=false,a3=true;
b0, a0=false,a1=true,a2=true,a3=false;
b0, a0=false,a1=true,a2=true,a3=true;
b0, a0=true,a1=false,a2=false,a3=false;
b0, a0=true,a1=false,a2=false,a3=true;
b0, a0=true,a1=false,a2=true,a3=false;
b0, a0=true,a1=false,a2=true,a3=true;
b0, a0=true,a1=true,a2=false,a3=false;
b0, a0=true,a1=true,a2=false,a3=true;
b0, a0=true,a1=true,a2=true,a3=false;
```

```
b0, a0=true,a1=true,a2=true,a3=true;
```



```
(%i1) t1:(not a1) and (not a3);
(%o1)  ~a1 ∧ ~a3

(%i2) t2: (not a0) and (not a2) and a3;
(%o2)  ~a0 ∧ ~a2 ∧ a3

(%i3) t3: (not a1) and (not a2);
(%o3)  ~a1 ∧ ~a2

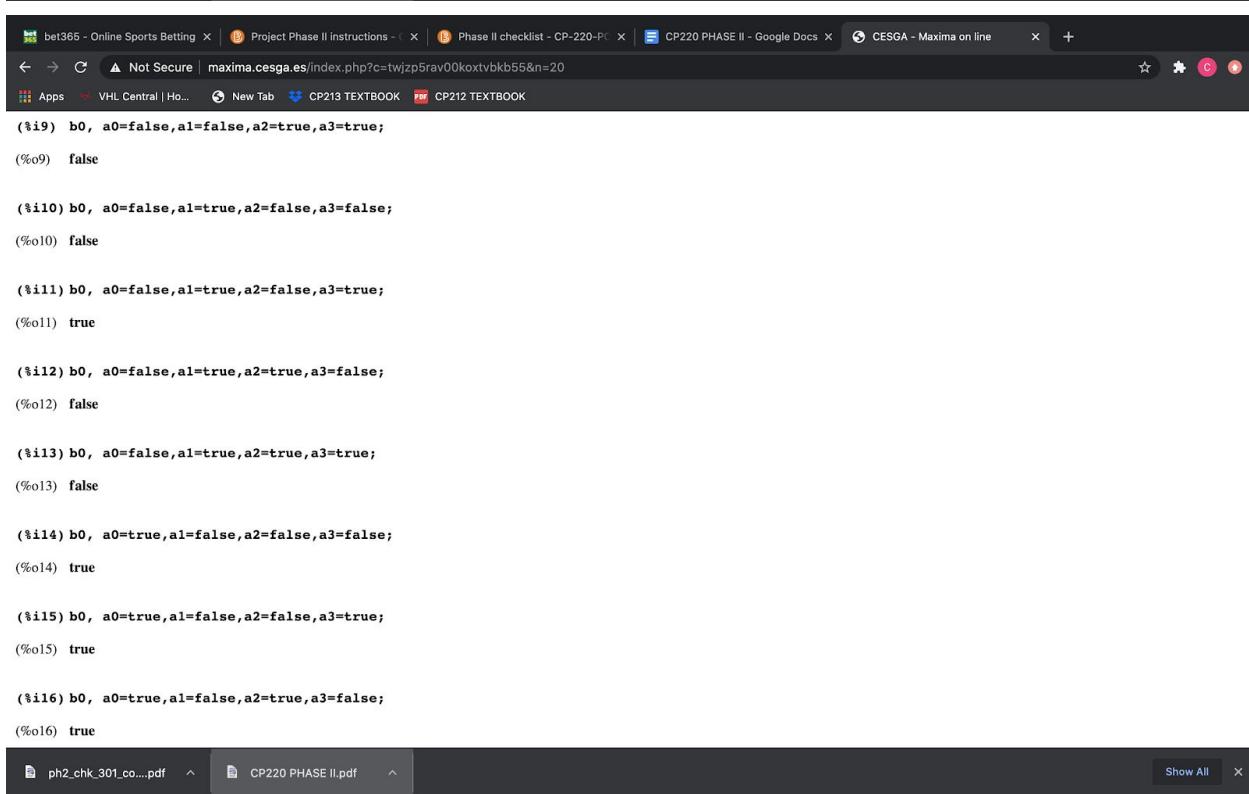
(%i4) t4: a0 and (not a2) and (not a3);
(%o4)  a0 ∧ ~a2 ∧ ~a3

(%i5) b0: t1 or t2 or t3 or t4;
(%o5)  ~a1 ∧ ~a3 ∨ ~a0 ∧ ~a2 ∧ a3 ∨ ~a1 ∧ ~a2 ∨ a0 ∧ ~a2 ∧ ~a3

(%i6) b0, a0=false,a1=false,a2=false,a3=false;
(%o6)  true

(%i7) b0, a0=false,a1=false,a2=false,a3=true;
(%o7)  true

(%i8) b0, a0=false,a1=false,a2=true,a3=false;
(%o8)  true
```



```
(%i9) b0, a0=false,a1=false,a2=true,a3=true;
(%o9)  false

(%i10) b0, a0=false,a1=true,a2=false,a3=false;
(%o10)  false

(%i11) b0, a0=false,a1=true,a2=false,a3=true;
(%o11)  true

(%i12) b0, a0=false,a1=true,a2=true,a3=false;
(%o12)  false

(%i13) b0, a0=false,a1=true,a2=true,a3=true;
(%o13)  false

(%i14) b0, a0=true,a1=false,a2=false,a3=false;
(%o14)  true

(%i15) b0, a0=true,a1=false,a2=false,a3=true;
(%o15)  true

(%i16) b0, a0=true,a1=false,a2=true,a3=false;
(%o16)  true
```

```

(%o14) true

(%i15) b0, a0=true,a1=false,a2=false,a3=true;
(%o15) true

(%i16) b0, a0=true,a1=false,a2=true,a3=false;
(%o16) true

(%i17) b0, a0=true,a1=false,a2=true,a3=true;
(%o17) false

(%i18) b0, a0=true,a1=true,a2=false,a3=false;
(%o18) true

(%i19) b0, a0=true,a1=true,a2=false,a3=true;
(%o19) false

(%i20) b0, a0=true,a1=true,a2=true,a3=false;
(%o20) false

(%i21) b0, a0=true,a1=true,a2=true,a3=true;
(%o21) false

```

Yamwi

ph2_chk_301.co....pdf ^ CP220 PHASE II.pdf ^ Show All X

B1 Truth Table

a3	a2	a1	a0	b1
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1

B1 Karnaugh Map

b1	a1a0				
a3a2		00	01	10	11
00	1	0	0	0	0
01	0	0	1	1	1
10	0	1	0	0	0
11	0	0	0	0	0

B1 SOP

$$B1 = (a3')(a2)(a1')(a0') + (a3)(a2')(a1')(a0) + (a3')(a2)$$

B1 Maxima

Code (with screen caps)

t1:(not a3) and (a2) and (not a1) and (not a0);

t2: (a3)and (not a2) and (not a1) and (a0);

t3: (not a3) and (a2);

b1: t1 or t2 or t3;

b1, a0=false,a1=false,a2=false,a3=false;

```
b1, a0=false,a1=false,a2=false,a3=true;
b1, a0=false,a1=false,a2=true,a3=false;
b1, a0=false,a1=false,a2=true,a3=true;
b1, a0=false,a1=true,a2=false,a3=false;
b1, a0=false,a1=true,a2=false,a3=true;
b1, a0=false,a1=true,a2=true,a3=false;
b1, a0=false,a1=true,a2=true,a3=true;
b1, a0=true,a1=false,a2=false,a3=false;
b1, a0=true,a1=false,a2=false,a3=true;
b1, a0=true,a1=false,a2=true,a3=false;
b1, a0=true,a1=false,a2=true,a3=true;
b1, a0=true,a1=true,a2=false,a3=false;
b1, a0=true,a1=true,a2=false,a3=true;
b1, a0=true,a1=true,a2=true,a3=false;
b1, a0=true,a1=true,a2=true,a3=true;
```

The screenshot shows a web browser window with multiple tabs open. The active tab displays a series of logical expressions and their results, likely from a Maxima software interface. The expressions involve variables a_0 , a_1 , a_2 , and a_3 . The results are marked with $(\%o)$ followed by a number, indicating the output of each expression.

```
(%i1) t1:(not a3) and (a2) and (not a1) and (not a0);
(%o1)  ~a3 ∧ a2 ∧ ~a1 ∧ ~a0

(%i2) t2: (a3) and (not a2) and (not a1) and (a0);
(%o2)  a3 ∧ ~a2 ∧ ~a1 ∧ a0

(%i3) t3: (not a3) and (a2);
(%o3)  ~a3 ∧ a2

(%i4) b1: t1 or t2 or t3;
(%o4)  ~a3 ∧ a2 ∧ ~a1 ∧ ~a0 ∨ a3 ∧ ~a2 ∧ ~a1 ∧ a0 ∨ ~a3 ∧ a2

(%i5) b1, a0=false,a1=false,a2=false,a3=false;
(%o5)  false

(%i6) b1, a0=false,a1=false,a2=false,a3=true;
(%o6)  false

(%i7) b1, a0=false,a1=false,a2=true,a3=false;
(%o7)  true

(%i8) b1, a0=false,a1=false,a2=true,a3=true;
(%o8)  false
```

The screenshot shows a web browser window with multiple tabs open. The active tab displays a Maxima session. The session output is as follows:

```
(%i9) b1, a0=false,a1=true,a2=false,a3=false;
(%o9) false

(%i10) b1, a0=false,a1=true,a2=false,a3=true;
(%o10) false

(%i11) b1, a0=false,a1=true,a2=true,a3=false;
(%o11) true

(%i12) b1, a0=false,a1=true,a2=true,a3=true;
(%o12) false

(%i13) b1, a0=true,a1=false,a2=false,a3=false;
(%o13) false

(%i14) b1, a0=true,a1=false,a2=false,a3=true;
(%o14) true

(%i15) b1, a0=true,a1=false,a2=true,a3=false;
(%o15) true

(%i16) b1, a0=true,a1=false,a2=true,a3=true;
(%o16) false
```

Below the Maxima session, there is a PDF viewer interface showing two files: "ph2_chk_301_co....pdf" and "CP220 PHASE II.pdf".

```

(%o13) false

(%i14) b1, a0=true,a1=false,a2=false,a3=true;
(%o14) true

(%i15) b1, a0=true,a1=false,a2=true,a3=false;
(%o15) true

(%i16) b1, a0=true,a1=false,a2=true,a3=true;
(%o16) false

(%i17) b1, a0=true,a1=true,a2=false,a3=false;
(%o17) false

(%i18) b1, a0=true,a1=true,a2=false,a3=true;
(%o18) false

(%i19) b1, a0=true,a1=true,a2=true,a3=false;
(%o19) true

(%i20) b1, a0=true,a1=true,a2=true,a3=true;
(%o20) false

```

Yamwi

ph2_chk_301.co....pdf ^ CP220 PHASE II.pdf ^ Show All X

B2 Truth Table

a3	a2	a1	a0	b2
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0

0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0

B2 Karnaugh Map

b2	a1a0				
a3a2		00	01	10	11
00	00	0	0	1	0
	01	1	0	0	1
	10	1	0	0	0
	11	0	0	0	0

B2 SOP

$$B2 = (a3')(a2')(a1)(a0') + (a1')(a0') + (a3')(a2)(a1)(a0)$$

B2 Maxima

Code (with screencaps)

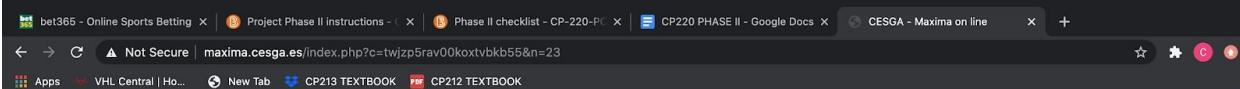
```
t1:(not a3) and (not a2) and (a1) and (a0);
```

t2: (not a1) and (not a0);

t3: (not a3) and (a2) and (a1) and (a0);

b2: t1 or t2 or t3;

b2, a0=false,a1=false,a2=false,a3=false;
b2, a0=false,a1=false,a2=false,a3=true;
b2, a0=false,a1=false,a2=true,a3=false;
b2, a0=false,a1=false,a2=true,a3=true;
b2, a0=false,a1=true,a2=false,a3=false;
b2, a0=false,a1=true,a2=false,a3=true;
b2, a0=false,a1=true,a2=true,a3=false;
b2, a0=false,a1=true,a2=true,a3=true;
b2, a0=true,a1=false,a2=false,a3=false;
b2, a0=true,a1=false,a2=false,a3=true;
b2, a0=true,a1=false,a2=true,a3=false;
b2, a0=true,a1=false,a2=true,a3=true;
b2, a0=true,a1=true,a2=false,a3=false;
b2, a0=true,a1=true,a2=false,a3=true;
b2, a0=true,a1=true,a2=true,a3=false;
b2, a0=true,a1=true,a2=true,a3=true;



```
(%i1) t1:(not a3) and (not a2) and (a1) and (a0);
(%o1)  ~a3 ∧ ~a2 ∧ a1 ∧ a0

(%i2) t2: (not a1) and (not a0);
(%o2)  ~a1 ∧ ~a0

(%i3) t3: (not a3) and (a2) and (a1) and (a0);
(%o3)  ~a3 ∧ a2 ∧ a1 ∧ a0

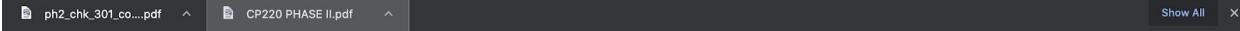
(%i4) b2: t1 or t2 or t3;
(%o4)  ~a3 ∧ ~a2 ∧ a1 ∧ a0 ∨ ~a1 ∧ ~a0 ∨ ~a3 ∧ a2 ∧ a1 ∧ a0

(%i5) b2, a0=false,a1=false,a2=false,a3=false;
(%o5)  true

(%i6) b2, a0=false,a1=false,a2=false,a3=true;
(%o6)  ~a1

(%i7) b2, a0=false,a1=false,a2=true,a3=false;
(%o7)  true

(%i8) b2, a0=false,a1=false,a2=true,a3=true;
```



```

bet365 - Online Sports Betting | Project Phase II instructions - | Phase II checklist - CP-220-PC | CP220 PHASE II - Google Docs | CESGA - Maxima on line
← → ⚡ Not Secure | maxima.cesga.es/index.php?c=twjzp5av00koxtvbkb55&n=23
Apps VHL Central | Ho... New Tab CP213 TEXTBOOK CP212 TEXTBOOK
(%i8) b2, a0=false,a1=false,a2=true,a3=true;
(%o8) true

(%i9) b2, a0=false,a1=true,a2=false,a3=false;
(%o9) false

(%i10) b2, a0=false,a1=true,a2=false,a3=true;
(%o10) false

(%i11) b2, a0=false,a1=true,a2=true,a3=false;
(%o11) false

(%i12) b2, a0=false,a1=true,a2=true,a3=true;
(%o12) false

(%i13) b2, a0=true,a1=false,a2=false,a3=false;
(%o13) false

(%i14) b2, a0=true,a1=false,a2=false,a3=true;
(%o14) false

(%i15) b2, a0=true,a1=false,a2=true,a3=false;
(%o15) false

(%i16) b2, a0=true,a1=false,a2=true,a3=true;
(%o16) false

(%i17) b2, a0=true,a1=true,a2=false,a3=false;
(%o17) true

(%i18) b2, a0=true,a1=true,a2=false,a3=true;
(%o18) false

(%i19) b2, a0=true,a1=true,a2=true,a3=false;
(%o19) true

(%i20) b2, a0=true,a1=true,a2=true,a3=true;
(%o20) false

```

Yamwi

B3 Truth Table

a3	a2	a1	a0	b3
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0

B3 Karnaugh Map

b3	a1a0				
a3a2		00	01	10	11
	00	0	0	0	0
	01	0	1	0	0
	10	0	0	0	0
	11	0	0	0	0

B3 SOP

$$B3 = (a3')(a2)(a1')(a0)$$

B3 Maxima

Code (with screencaps)

```
t1:(not a3) and (a2) and (not a1) and (a0);
```

```
b3: t1;
```

```
b3, a0=false,a1=false,a2=false,a3=false;
b3, a0=false,a1=false,a2=false,a3=true;
b3, a0=false,a1=false,a2=true,a3=false;
b3, a0=false,a1=false,a2=true,a3=true;
b3, a0=false,a1=true,a2=false,a3=false;
b3, a0=false,a1=true,a2=false,a3=true;
b3, a0=false,a1=true,a2=true,a3=false;
b3, a0=false,a1=true,a2=true,a3=true;
b3, a0=true,a1=false,a2=false,a3=false;
b3, a0=true,a1=false,a2=false,a3=true;
b3, a0=true,a1=false,a2=true,a3=false;
b3, a0=true,a1=false,a2=true,a3=true;
b3, a0=true,a1=true,a2=false,a3=false;
b3, a0=true,a1=true,a2=false,a3=true;
b3, a0=true,a1=true,a2=true,a3=false;
b3, a0=true,a1=true,a2=true,a3=true;
```

```
(%i1) t1:(not a3) and (a2) and (not a1) and (a0);  
(%o1) ~a3 ∧ a2 ∧ ~a1 ∧ a0  
  
(%i2) b3: t1;  
(%o2) ~a3 ∧ a2 ∧ ~a1 ∧ a0  
  
(%i3) b3, a0=false,a1=false,a2=false,a3=false;  
(%o3) false  
  
(%i4) b3, a0=false,a1=false,a2=false,a3=true;  
(%o4) false  
  
(%i5) b3, a0=false,a1=false,a2=true,a3=false;  
(%o5) false  
  
(%i6) b3, a0=false,a1=false,a2=true,a3=true;  
(%o6) false  
  
(%i7) b3, a0=false,a1=true,a2=false,a3=false;  
(%o7) false  
  
(%i8) b3, a0=false,a1=true,a2=false,a3=true;  
(%o8) false  
  
(%i9) b3, a0=false,a1=true,a2=true,a3=false;  
(%o9) false  
  
(%i10) b3, a0=false,a1=true,a2=true,a3=true;  
(%o10) false  
  
(%i11) b3, a0=true,a1=false,a2=false,a3=false;  
(%o11) false  
  
(%i12) b3, a0=true,a1=false,a2=false,a3=true;  
(%o12) false  
  
(%i13) b3, a0=true,a1=false,a2=true,a3=false;  
(%o13) true  
  
(%i14) b3, a0=true,a1=false,a2=true,a3=true;  
(%o14) false  
  
(%i15) b3, a0=true,a1=true,a2=false,a3=false;  
(%o15) false
```

```
(%i16) b3, a0=false,a1=false,a2=true,a3=false;  
(%o16) false  
  
(%i17) b3, a0=false,a1=false,a2=true,a3=true;  
(%o17) false  
  
(%i18) b3, a0=false,a1=true,a2=false,a3=true;  
(%o18) false  
  
(%i19) b3, a0=false,a1=true,a2=true,a3=false;  
(%o19) false  
  
(%i20) b3, a0=false,a1=true,a2=true,a3=true;  
(%o20) false  
  
(%i21) b3, a0=true,a1=false,a2=false,a3=false;  
(%o21) false  
  
(%i22) b3, a0=true,a1=false,a2=false,a3=true;  
(%o22) false  
  
(%i23) b3, a0=true,a1=false,a2=true,a3=false;  
(%o23) true  
  
(%i24) b3, a0=true,a1=false,a2=true,a3=true;  
(%o24) false  
  
(%i25) b3, a0=true,a1=true,a2=false,a3=false;  
(%o25) false
```

The screenshot shows a web browser window with several tabs open. The active tab is a Maxima command-line interface. The session starts with:

```
(%o11) false
```

Then it lists 18 different configurations of variables `b3`, `a0`, `a1`, `a2`, and `a3`, each followed by the result `false`:

```
(%i12) b3, a0=true,a1=false,a2=false,a3=true;
(%o12) false

(%i13) b3, a0=true,a1=false,a2=true,a3=false;
(%o13) true

(%i14) b3, a0=true,a1=false,a2=true,a3=true;
(%o14) false

(%i15) b3, a0=true,a1=true,a2=false,a3=false;
(%o15) false

(%i16) b3, a0=true,a1=true,a2=false,a3=true;
(%o16) false

(%i17) b3, a0=true,a1=true,a2=true,a3=false;
(%o17) false

(%i18) b3, a0=true,a1=true,a2=true,a3=true;
(%o18) false
```

Yamwi

ph2_chk_301.co....pdf CP220 PHASE II.pdf Show All X

Final Part

Logic Equation

The first 11 digits of Pi are: 3,1,4,1,5,9,2,6,5,3,5. So for each binary input starting from 0000 to 1111 will generate either an error, or one of these numbers.

Circuit Diagrams

Video Attached

Circuit

