

creation: 07/07/06; corrected 03/30/10

# Review of Truth Tables and De Morgan's Rules

1. Complete the following truth table:

Operand	Operand	Expression
<code>x &lt;= y</code>	<code>y &gt; 100</code>	<code>x &lt;= y    y &gt; 100</code>
F	F	T or F?
F	T	T or F?
T	F	T or F?
T	T	T or F?

Decide from the table what the value of the expression is is when `x == 150` and `y == 125`. T or F?

2. Complete the following truth table:

Operand	Operand	Expression
<code>ch &gt;= 'a'</code>	<code>ch &lt;= 'z'</code>	<code>ch &gt;= 'a' &amp;&amp; ch &lt;= 'z'</code>
F	F	T or F?
F	T	T or F?
T	F	T or F?
T	T	T or F?

Decide from the table what the value of the expression is is when `ch == 'A'`. T or F?

3. Complete the following truth table:

Operand	Operand	Operand	Subexpression	Expression
<code>ch &gt;= 'a'</code>	<code>ch &lt;= 'z'</code>	<code>ch == '?'</code>	<code>ch &gt;= 'a' &amp;&amp; ch &lt;= 'z'</code>	<code>(ch &gt;= 'a' &amp;&amp; ch &lt;= 'z')    ch == '?'</code>
F	F	F	T or F?	T or F?
F	F	T	T or F?	T or F?
F	T	F	T or F?	T or F?
F	T	T	T or F?	T or F?
T	F	F	T or F?	T or F?

T	F	T	T or F?	T or F?
T	T	F	T or F?	T or F?
T	T	T	T or F?	T or F?

Decide from the table what the value of the expression is when `ch == 'x'`.

4. Is `!A && B` equivalent to `A || !B` ? Complete the table to find out.

Operand	Operand	Subexpression	Subexpression	Expression	Expression
A	B	!A	!B	!A && B	A    !B
F	F	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
F	T	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
T	F	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
T	T	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

The two expressions are equivalent if the T / F values in the last two columns are the same.

Are the two columns the same?

Now use De Morgan's Rule:

`!(A && B)` is equivalent to `!A || !B`

to rewrite `!( !A && B )`.

5. You wish to purchase a certificate of deposit, but only if the interest rate is greater than three percent and the minimum deposit is less than 10000. Fill in the blanks.

```
if ( interest  3  minimum  10000)
    System.out.println("Buy this CD");
else
    System.out.println("Reject this CD");
```

Rewrite the above fragment so that it fits the following.

```
if ( interest  3  minimum  10000)
    System.out.println("Reject this CD");
else
    System.out.println("Buy this CD");
```

(The first program fragment is probably the best way to write this.)

6. A program is searching for books with a call number that starts "QA" published between 1990 and 1995 (inclusive) with the word "web" in the title. Assume that the attributes of a book are accessed by `book.getTitle()`, `book.getDate()`, and `book.getCall()`. Recall that `indexOf( String sub )` returns the integer index of the substring, or -1 if the substring is not found.

```
if ( book.getCall().indexOf("QA")  0 
```

book.getDate()  1990

book.getDate()  1995

book.getTitle().indexOf("Web")  0 )

```
System.out.println( book.getCall(), book.getTitle() );
```

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End of the Exercise. If you want to do it again, click on "Refresh" in your browser window. [Click here](#) to go back to the main menu.