AP Computer Science Principles
Ticket Out the Door
Set 28: Boolean Expressions

Name _____ Period _____

Skill 28.01 Exercise 1

Refer to the following variable declarations, then indicate the output for each `console.log()`

```
var a = 8;
var b = 9;
var c = a;
var d = "hello";
var e = "goodbye";
```

`console.log(a == b);`	
`console.log(a > b);`	
`console.log(a < b);`	
`console.log(d == e);`	
`console.log(d > e);`	

Skill 28.02 Exercise 1

Evaluate whether each of the following is true or false for the conditions below,
`x = 11 and y = 5`

`(( x < 10 ) AND ( y = 6 )`	
`(( x < 10 ) AND ( y = 5 )`	
`(( x > 10 ) AND ( y ≠-3 )`	
`(( x < 10 ) OR ( y = 5 ))`	
`(( x > 10 ) OR ( y = 5 ))`	

Skill 28.02 Exercise 2

Refer to the following variable declarations, then (a) Re-write each statement using proper JavaScript syntax and (b) indicate whether the statement evaluates to *true* or *false*

```
var x = 79;
var y = 46;
var z = -3;
var w = 13.89;
var y = 40.0;
var t = true;
var f = false;
```

Statement	Proper JavaScript syntax	T/F
`(( x < 10 ) AND ( y = 46 )`		
`(( x > 10 ) AND ( y = 46 )`		

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`(( x > 10 ) AND ( z ≠ -3 )`		
`(( x > 10 ) OR ( y = 5 ))`		
`true AND false`		
`true AND !false`		
`!t OR f`		
`x ≠ 3 OR f`		
`y/2 > w AND w ≠ x`		

Skill 28.03 Exercise 1

Refer to the following code to evaluate what is printed.

```
var x = 79, y = 46, z = -3;
var d = 13.89, jj = 40.0;
var b = true, c = false;
```

`console.log( b && c || !c);`	
`console.log( x == y && !(z < 0) || b && c);`	
`console.log( x != y && y==z && b || !c);`	
`console.log( x > y || c || b && jj%4 != 0);`	

Skill 28.04 Exercise 1

Simplify the following

!(A > B || B != A)	
! (A == B || (B >= C || B < A))	

Skill 28.04 Exercise 2

Which of the following Boolean expressions are equivalent to the expression $num \geq 15$?

Select two answers.

A	`(num > 15) AND (num = 15)`
B	`(num > 15) OR (num = 15)`
C	`NOT (num < 15)`
D	`NOT (num < 16)`

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A NAND gate is a type of logic gate that produces an output of `false` only when both of its two inputs are `true`. Otherwise, the gate produces an output of `true`. Which of the following Boolean expressions correctly models a NAND gate with inputs P and Q ?

A   `(NOT P) AND (NOT Q)`

B   `(NOT P) AND Q`

C   `NOT (P AND Q)`

D   `NOT (P OR Q)`

Skill 28.04 Exercise 3

The table below shows the value of expression base on the values of input1 and input2

Value of input1	Value of input2	Value of expression
true	true	false
true	false	true
false	true	true
false	false	true

Write an expression in terms of input1 and input2 that would produce the output.

Skill 28.05 Exercise 1

In a certain country, a person must be at least 16 years old to drive a car and must be at least 18 years old to vote. The variable age represents the age of a person as an integer.

Write a function that accepts age as a parameter and returns true if the person is old enough to drive but not old enough to vote and returns false otherwise.

Skill 28.05 Exercise 2

A programmer wants to determine whether a score is within 10 points of a given `target`. For example, if the `target` is 50, then the scores 40, 44, 50, 58, and 60 are all within 10 points of the `target`, while 38 and 61 are not.

Write a function that accepts `score` as a parameter and returns `true` if and only if the `score` is within 10 points of the `target`?