C++Logical Expressions Practice Worksheet

Name_____

**Remember that all nonzero values are considered true.

A.) Evaluate the following Logical expressions (true or false):

	Evaluate the logical expression:	T or F?
1.)	(true && false)	
2.)	(true || false)	
3.)	(!0)	
4.)	((5 + 4 < 3) && (7 + 3 <= 20))	
5.)	('a' != 'b' – 1)	
6.)	(! (7 == 7))	
7.)	(3 % 2)	
8.)	(!1 || !0)	

Operator Precedence
* / %
+ –
< ≤ > ≥
== !=
&&
||

B.) Evaluate the following Logical expressions, where the integer variables have the given values:

	Given:	Evaluate the logical expression a = 1, b = 2 & c = 3:	T or F ?
9.)	a = 1, b = 2 & c = 3	((a < b) || (c == 2))	
10.)	a = 1, b = 2 & c = 3	((a < b) && (c = 2))	
11.)	a = 1, b = 2 & c = 3	((b > 1) || (c < a) && (b < 0))	
12.)	a = 1, b = 2 & c = 3	((b < 1) || (a > 0) && (b < 0))	
13.)	a = 1, b = 2 & c = 3	(!(b > a))	
14.)	a = 1, b = 2 & c = 3	(b)	
15.)	a = 1, b = 2 & c = 3	(!a)	
16.)	a = 1, b = 2 & c = 3	(0 – c)	
17.)	a = 5 and b = 6	((a < b) || (!b) && (6 >= b) && ((b < 3) || a))	

18.)	a = 5, b = 2 & c = 4	(a % b * c)	
19.)	a = 5, b = 2, c = 4	((a % b * c > 5) || (c % b * (a + 1) < 7))	
20.)	j = 2, k = 3, and m = 2	((k + m < j) || (3 - j >= k))	
21.)	j = 2 and m = 2	(! (j - m))	
22.)	x = 6 and y = 7	((x <= 10) || (x / (y − 8) > 3))	
23.)	x = 6 and y = 7	((x / (y − 8) > 3) || (x <= 10))	
24.)	a = 5, b = 2, and c = 4	((a % b * c) && (c % b * a))	
25.)	a = 5, b = 2, and c = 4	((a % b * c) || (c % b * a))	
26.)	a = 5, b = 2, and c = 4	((b % c * a) && (a % c * b))	
27.)	a = 5, b = 2, and c = 4	((b % c * a) || (a % c * b))	

C.) Evaluate the following Logical expressions involving the ordering of strings (true or false):

	Evaluate the logical expression:	true or false?
28.)	("Tom" < "Sam")	
29.)	("Tom" < "Tomato")	
30.)	("Tommy" < "Tombstones")	
31.)	("Tommy" < "Tammy")	
32.)	("church" < "Churchill")	
33.)	("Car" < "Bar")	
34.)	("Tom" < "Tom")	
35.)	("Tom " < "Tom")	
36.)	("car make" < "carburetor")	
37.)	("Harry" < "hairy")	
38.)	("C++" < "Car")	
39.)	("Car" < "Carl")	
40.)	(" " < "A")	

String Ordering
Uppercase letters before lowercase ("Z" < "a")
Space before all printable chars
numbers and math operators before letters
"nothing" before "anything" including spaces

This table will NOT be provided at the test

Tracing "if" statements Practice Worksheet

A.) What output is produced by each code segment shown below:

1.	2.	3.	4.

int x = 25;
 	
if (x == 25)
  cout << "A";
else
  cout << "B";
	int x = 12;
	
	if (x != 12)
	  cout << "YES";
	else
	  cout << "NO";
		double max = 12.7;
		
		if (max >= 12)
		  cout << "A";
		else
		  cout << "B";
			int x = 12;
			
			if (x >= 12)
			  cout << "HEY";
			  cout << "YOU";

			hint: fix indentation 1st

5.	6.	7.	8.

int x = 35,
  y = 45,
  z;
 	
if (x > y)
  z = x + y;
else
  z = y – x;
 	
cout << z;
	int x = 25;
	
	if (x / 2 == 12)
	{
	  cout << "A";
	}
	else
	{
	  cout << "B";
	}
	cout << "C";
		int x = 12;
		
		if (x > 12)
		{
		  if (x < 15)
		  cout << "A";
		}
		else
		  cout << "B";
		  cout << "C";
			int x = 20;
			
			if (x > 15)
			  if (x < 17)
			  cout << "A";
			else
			  cout << "B";
			  cout << "C";

9.	10.	11.	12.

int x = 12;
 	
if (x > 12)
if (x < 15)
cout << "A";
else
cout << "B";
cout << "C";
	int x = 12;
	
	if (x > 12)
	{
	  cout << "A";
	}
	  cout << "B";
		int temp = 105;
		
		if (temp = 32)
		  cout << "cold!";
		else
		  cout << "hot!";
			int i = 99;
			
			if (i = 101)
			  cout << i;
			else
			  cout << (i – 1);

13.	14.	15.	16.

int x = 11,
y = 9;
 	
if (x < 10)
if (y > 10)
cout << "A" ;
else
cout << "B" ;
cout << "C" ;
	int x = 9,
	y = 9;
	
	if (x < 10)
	if (y > 10)
	cout << "A" ;
	else
	cout << "B" ;
	cout << "C" ;
		int x = 8,
		y = 12;
		
		if (x < 10)
		if (y > 10)
		cout << "A" ;
		else
		cout << "B" ;
		cout << "C" ;
			int x = 12,
			y = 12;
			
			if (x < 10)
			if (y > 10)
			cout << "A" ;
			else
			cout << "B" ;
			cout << "C" ;

17.	18.	19.

int x = 0,
y = 0,
z = 1;
 	
if ((z < x) || (y >= z) && (z == 1))
if (z && y)
y = 2;
else
x = 2;
 	
cout << x << y;
	int x = 0,
	y = 1,
	z = 1;
	
	if ((z < x) || (y >= z) && (z == 1))
	if (z && y)
	y = 2;
	else
	x = 2;
	
	cout << x << y;
		int a = 3,
		b = 4,
		c = 1;
		
		if (a < b)
		cout << "a < b ";
		else
		cout << "b < a ";
		cout << "b < c ";

20.	21.	22.	23.	24.

int a = 22,
b = 11;
 	
if (a == 22)
if (b == 22)
cout << "A";
else
cout << "B";
cout << "C";
	int a = 11,
	b = 22;
	
	if (a == 22)
	if (b == 22)
	cout << "A";
	else
	cout << "B";
	cout << "C";
		int a = 22,
		b = 22;
		
		if (a == 22)
		if (b == 22)
		cout << "A";
		else
		cout << "B";
		cout << "C";
			if (0)
			cout << 'T';
			else
			cout << 'F';
				if (23)
				cout << 'T';
				else
				cout << 'F';

B. For exercises 1 to 27, indicate the output that will be produced. Assume the following declarations:

```
const int MAX = 25,
          LIMIT = 100;
int   num1 = 12,
      num2 = 25,
      num3 = 87;
```

1.
```
if (num1 < MAX)
   cout << "A";
```

2.
```
if (num2 <= MAX)
   cout << "A";
cout << "B";
```

3.
```
if (MAX > num3)
   cout << "A";
cout << "B";
```

4.
```
if (num3 >= LIMIT)
   cout << "A";
   cout << "B";
   cout << "C";
```

5.
```
if (num2 == MAX)
{
   cout << "A";
   cout << "B";
}
cout << "C";
```

6.
```
if ( num3 - num2 > 2 * MAX)
   cout << "A";
else
   cout << "B";
```

7.
```
if (LIMIT + num3 <= 150)
{
   cout << "A";
   cout << "B";
}
else
   cout << "C";
```

8.
```
if (2 * num1 != num2)
   cout << "A";
else
{
   cout << "B";
   cout << "C";
}
```

9.
```
if ( LIMIT % MAX == 3 )
   cout << "A";
else
   if ( num2 == MAX )
      cout << "B";
   else
      cout << "C";
```

10.
```
if (num1 < MAX)
   if (LIMIT >= num2)
      cout << "A";
cout << "B";
```

11.
```
if (LIMIT <= LIMIT)
   if (num3 == num1)
      cout << "A";
cout << "B";
```

12.
```
if (num2 > 18)
   if (num1 < 0)
      cout << "A";
   else
      cout << "B";
cout << "C";
```

13.
```
if (LIMIT >= 4 * num2)
   if (MAX == 25)
      cout << "A";
   else
      cout << "B";
else
   cout << "C";
```

14.
```
if (num2 < num1)
   if (num3 < LIMIT)
      cout << "A";
else
   cout << "B";
cout << "C";
```

15.
```
if ( num3 == 87 )
{
   if (num2 != MAX)
      cout << "A";
}
else
   cout << "B";
cout << "C";
```

16.
```
if (num1 + num2 > num3)
   cout << "A";
else
   if (num2 * LIMIT != 3298)
      cout << "B";
```

17.
```
if (num2 > num1 && LIMIT != 100)
   cout << "A";
   cout << "B";
```

18.
```
if ( num3 >= MAX )
{
  if (MAX / num2 == 1)
    cout << "A";
    cout << "B";
  if (LIMIT - num3 > num1 + 2)
    cout << "C";
  else
  {
    cout << "D";
  }
}
else
  if (num2 * 2 == MAX * 2)
    cout << "E";
  else
    cout << "F";
cout << "G";
```

19.
```
if ( LIMIT % num1 + 4 == num1 + (MAX - num2 ) )
{
  cout << "A";
  cout << "B";
}
else
{
  cout << "C";
  cout << "D";
}
```

20.
```
if (num3 == num2 && MAX > 50)
   cout << "A";
   cout << "B";
```

21.
```
if (num3 == 87 || num2 > num1 && MAX > LIMIT)
   cout << "A";
   cout << "B";
```

22.
```
if (num3 < 40 || num3 > 50)
   cout << "A";
   cout << "B";
```

23.
```
if (MAX == LIMIT || num1 * 2 == num2)
   cout << "A";
   cout << "B";
```

24.
```
if (num2 % 2 != 0 || num3 > LIMIT)
   cout << "A";
   cout << "B";
```

25.
```
if (MAX == 25 && num2 != MAX || num1 < num3)
   cout << "A";
  cout << "B";
```

26.
```
if (num1 > 7 && LIMIT <= 100)
   cout << "A";
   cout << "B";
```

27.
```
if ((num3 == 87 || num2 > num1) && MAX > LIMIT)
   cout << "A";
   cout << "B";
```

Writing "if" statements Practice Worksheet

For exercises 1 to 28, write code segments (on a different paper) using if statements that will perform the specified action. Assume that all variables have already been declared and given values.

1.	Add 5 to **num2** when **num1** is positive.
2.	Display **num1** and assigns its value to **num2** when **num1** is 100.
3.	If **x** is greater than **y** or less than **z**, then display **x, y,** and **z.**
4.	If **num1** is between 100 and 200 (inclusive), then double it; otherwise, halve it.
5.	If **num1** is not between 100 and 200 (inclusive),.display an error message and ask the user to enter a new value for **num1**. (Do not use ! (not))
6.	If **num1** is odd, increment it by 1.
7.	If neither **num1** nor **num2** is 0, display a message to that effect.
8.	Display "divides!" if **sum** is evenly divisible by **count**.
9.	Increment the integer variable **total** if **total** is zero and decrement **total** otherwise.
10.	Print "num is zero", "num is even", or "num is odd" as appropriate based on the current value of **num1**.
11.	Use a "nested-if" to print "Victory" only if **result** is greater than or equal to 500 and **penalty** is equal to zero.
12.	Assign the smallest of two integer values **num1** and **num2** to the variable **smallest**.
13.	Assign the smallest of three integer values **num1, num2,** and **num3** to the variable **smallest**. (Do not use && or ||)
14.	Write an if/else statement that displays the message "finished" if the value of the variable **numberOfTimes** is greater than or equal to 5. Otherwise, the message "not finished" displays.

15.	Display a message that states whether or not someone is old enough to drive, based on their current **age**.
16.	Determine if a number, **num1**, is within the range 0 to 100. Display "in" or "out".
17.	Display 2 chars, **letter1** and **letter2** in alphabetic order.
18.	Display 2 strings, **name1** and **name2** in alphabetic order.
19.	Display "good" or "bad" based on the flag **validResult.**
20.	If **num1** and **num2** are both positive, print the smaller of the two values.
21.	When **num1** is positive: display "one" if **num2** is also positive and display "two" if **num2** is not positive. When **num1** is not positive: display "three" if **num3** is even and display "four" if **num3** is odd.
22.	Assume your boss has told you that pay given for overtime is "time and a half" the regular rate (that is 1.5 times regular pay). If the variable **pay** holds pay per hour, and the variable **hours** holds total hours worked, give a statement to compute **salary**.
23.	If the bool variable **ownsCar** is true if the person owns a car and false otherwise, and the int variable **age** hold the age, write an if statement that identifies workers who are between 18-65, and own a car.
24.	Write a chained if statement to display a message showing the educational level of a student based on the number of years of schooling, **numYrs**: (0 is none, 1-6 is elementary, 7-8 is middle school, 9-12 is high school, greater than 12 is college). Display a message to indicate that the data entered is bad, if a negative number was entered. (NO &&, NO ||)
25.	Display a message telling whether or not **number** is positive
26.	Display a message telling whether or not **letter** is an uppercase letter that follows 'M' in the alphabet.
27.	Display a message telling whether or not **num1** is evenly divisible by three.
28.	Write a chained if statement to set the discount rate, **discRate**, based on the purchase amount, **purchAmt**. For purchase amounts < \$5000, there is no discount. For purchase amounts < \$10000, but ≥ \$5000 there is a 10% discount. For purchase amounts ≥ \$10000 there is a 20% discount.