1. Correct Answer: B
The main purpose of analysis is to determine the requirements for a system.

2. Correct Answer: A
Android was developed by Google and is used extensively on mobile phones and tablet computers.

3. Correct Answer: C
Line 6 will be executed when i = 1 and i = 3

4. Correct Answer: E
The output is as follows with 5 & 412 being written on the last iteration of the for loop.
```
1
50
2
100
3
102
4
408
5
412
```

The trace of the code is:

bigvalue	i	value[i]	
50	0	1	set i to 0 then output value [0]
			check i%2 == 1 (false execute else)
50	0	1	add i to bigvalue
50	1	2	increment i then output value[1]
			check i%2 == 1 (true execute if)
100	1	2	multiply bigvalue by value[i]
100	2	3	increment i then output value [2]
			check i%2 == 1 (false execute else)
102	2	3	add i to bigvalue
102	3	4	increment i then output value[3]
			check i%2 == 1 (true execute if)
408	3	4	multiply bigvalue by i
408	4	5	increment i then output value [4]
			check i%2 == 1 (false execute else)
412	4	5	add i to bigvalue
412	5	?	increment i, for loop terminates

5. Correct Answer: A
=, +=, and *= are assignment operators in C++.
The == operator is not an assignment, but rather it is a comparison.

6. Correct Answer: E
All of the statements are true in regards to UNICODE.

7. Correct Answer: D

Album is not used to describe how information is stored on a hard drive.

8. Correct Answer: C

```
10101101 = 1*2^7 + 0*2^6 + 1*2^5 + 0*2^4 + 1*2^3 + 1*2^2 +0*2^1 +1*2^0
         = 1*128 + 0*64 + 1*32 + 0*16 + 1*8 + 1*4 + 0*2 + 1*1
         = 128 + 32 + 8 + 4 + 1
         = 173
```

9. Correct Answer: D

Treat each hexadecimal digit as 4 binary digits. This can be done because $16^1 = 2^4$.

```
193    = 1*16^2 + 9*16^1 + 3*16^0
       = 0001   1001   0011        Now discard the leading 0s.
       = 110010011
```

10. Correct Answer: D

A truth table with four input variables will have 2^4 different possible combinations for the input variables, given that each of the four variables has two different states (true or false). Each of the 8 lines can be true or false, so the total number of different output configurations for all the possible input configurations would be $2^{(24)}$ = 65536.

11. Correct Answer: A

A	B	C	BC'	**a)**	A'C'	b)	A'BC'	c)	d)	e)
F	F	F	F	**F**	T	T	F	F	T	T
F	F	T	F	**F**	F	F	F	F	T	T
F	T	F	T	**T**	T	T	T	F	T	F
F	T	T	F	**F**	F	F	F	F	T	T
T	F	F	F	**T**	F	T	F	F	T	T
T	F	T	F	**T**	F	T	F	F	T	T
T	T	F	T	**T**	F	T	F	F	F	T
T	T	T	F	**T**	F	T	F	F	F	T

12. Correct Answer: B

Linked lists may grow and shrink dynamically during program execution. Because the linked list uses a pointer to find the next item in a list, inserting or deleting items in the list is usually easier than doing so in an array as only the pointer need be changed and the actual data does not need to be swapped. Because the linked list node contains a pointer and the data elements, while the array need only contain the data elements, the linked list node takes up more memory. Binary searches cannot be implemented with linked lists as the list must be traversed in order to reach different data elements, where in a array the programmer can jump to specific points in the array without traversing elements between given nodes.

13. Correct Answer: C

Binary searches cut the number of items to search in half with each comparison made while linear searches go through each element one at a time. Linear searches may need to look at every item in the list in the worst case while for N elements, the worst case for a binary search is $(\log_2 N)$. On average, linear searches work longer than binary searches and can be implemented regardless of whether the data is sorted or not. However, binary searches will only work on sorted data. For the 100 items provided, the linear search would need a maximum of 100 comparisons while a binary search would need a maximum of 7 comparisons.

14. Correct Answer: A

The object b has a radius of 5 and when bounced from a height of 12 will bounce 0.75*12 or 9. The radius of the object c uses the default argument of 1 when constructed making the radius of c 1.

15. Correct Answer: D

Inline methods have the code for the operation of the code when it is defined. Both the constructor and bounce method are defined and have the code follow after the function header. The setRadius and getRadius methods are defined on the same line as the method declaration. While inline implies that the code is on the same line as the definition, that need not be the case; the function/method code may span multiple lines, it must however be located with the function definition.

16. Correct Answer: E

```
(X >= Y) || (Y != Z && Z <50)          // insert values
(5 >= 30) || (30 != 50 && 50 < 50)  // evaluate expressions
(FALSE) || (TRUE && FALSE)           // TRUE and FALSE equals FALSE
(FALSE) || (FALSE)
FALSE
```

17. Correct Answer: A

The queue places items at the end of the list and takes them front, much like the line at a grocery store checkout. The following commands and state of the queue are traced below.

```
COMMAND                  QUEUE
ENQUEUE(A);              A
ENQUEUE(Z);              AZ
ENQUEUE(Q);              AZQ
DEQUEUE();               ZQ
ENQUEUE(B);              ZQB
ENQUEUE(R);              ZQBR
DEDQUEUE();              QBR
```

18. Correct Answer: E

Both multiply and divide return integers. add is a void function, so it returns no value.

19. Correct Answer: E

The divide function has three arguments. The first two are passed by value, but the third is passed by reference. The third variable, mod, is actually a memory location that has scope within the function that calls divide. If mod is changed in the function, it also changes the value of the variable in the calling function. This can be used to communicate more information to the calling function than just a function that strictly uses the return statement.
The other two functions, add and multiply, have two arguments that are passed by value. The values are copied into new variables a and b that only have scope while the functions are running.

20. Correct Answer: D

The function call to add attempts to send the output of add to the screen using cout. However, since the add function is void, no output exists causing an error.

21. Correct Answer: D

main i = 1;
call to add(i, multiply(i,i));
    first calls multiply(i,i);
        returns 1
    adds 1 to 1 and displays "1: 1 + 1 = 2"
i++ in main now i=2
call add(i, multiply(i,i));
    calls mulitply(i,i);
        returns 4;
Having saved static variable c from last call, increments static variable c to 2
displays "2: 2 + 4 = 6"
i++ in main now i=3
call add(i, multiply(i,i));
    calls multiply(i,i);
        returns 9;
    Having saved static variable c at 2 from last call, increments to 3
    displays "3: 3 + 9 = 12"
i++ in main now=4, for loop terminates.

22. Correct Answer: C

The output will be:
2: 1
6: 1
10: 1

The trace of the code is:

main	`int k;`	k is declared but its value is undefined
main	`for (int i=2; i<11; i+=4)`	i is set to 2 k is undefined
main	`cout << i << ":  " << divide(i,i+3,k) << endl;`	(2, 5, undefined) is passed to divide
divide	`mod = a%b;`	2%5 is 2 and k is also set to 2
divide	`return a/mod;`	2/2 is 1 and 1 is returned to main
main	`cout << i << ":  " << divide(i,i+3,k) << endl;`	i = 2, divide = 1 output is 2: 1
main	`for (int i=2; i<11; i+=4)`	i is incremented by 4 to 6 k is 2
main	`cout << i << ":  " << divide(i,i+3,k) << endl;`	(6, 9, 2) is passed to divide
divide	`mod = a%b;`	6%9 is 6 and k is also set to 6
divide	`return a/mod;`	6/6 is 1 and 1 is returned to main
main	`cout << i << ":  " << divide(i,i+3,k) << endl;`	i = 6, divide = 1 output is 6: 1
main	`for (int i=2; i<11; i+=4)`	i is incremented by 4 to 10 k is 6

main	`cout << i << ":   " << divide(i,i+3,&k) << endl;`	(10, 13, 6) is passed to divide
divide	`mod = a%b;`	10%13 is 10 and k is also set to 10
divide	`return a/mod;`	10/10 is 1 and 1 is returned to main
main	`cout << i << ":   " << divide(i,i+3,&k) << endl;`	i = 10, divide = 1 output is 10: 1

23. Correct Answer: C

The array has two rows with five items each for a total of ten elements. Because the loop only executes four times, only the first four elements from each of the array's two rows are used in the calculations.

24. Correct Answer: B

The output is as follows:
12
26
416
7488

The trace of the code is:

1st iteration	i = 0
	final = 0
	value[0][i] -> value[0][0] -> 1
	1 is less than 3 so, the if path will be taken
	   final += value[0][0] + value[1][0]
	   which is:
	   final = final + value[0][0] + value[1][0]
	   which is:
	   final = 0 + 1 + 11
	   which is:
	   final = 12

2nd iteration	i = 1
	final = 12
	value[0][i] -> value[0][1] -> 2
	2 is less than 3 so the if path will be taken
	   final += value[0][1] + value[1][1]
	   which is:
	   final = final + value[0][1] + value[1][1]
	   which is:
	   final = 12 + 2 + 12
	   which is:
	   final = 26

3rd iteration	i = 2
	final = 26
	value[0][i] -> value[0][2] -> 3
	3 is not less than 3 so the else path will be taken
	   final *= value[0][2] + value[1][2]
	   which is:
	   final = final + value[0][2] + value[1][2]
	   which is:
	   final = 26 * (3 + 13)
	   which is:
	   final = 416

| 4th iteration | ```
i = 3
final = 416
value[0][i] -> value[0][3] -> 4
4 is not less than 3 so the else path will be taken
    final *= value[0][3] + value[1][3]
    which is:
    final = final + value[0][3] + value[1][3]
    which is:
    final = 416 * (4 + 14)
    which is:
    final = 7,488
``` |
|---|---|

25. Correct Answer: B
endl writes a newline character to the standard output stream.

26. Correct Answer: A
The code sorts the array in ascending order.

27. Correct Answer: E
my_numb [9] holds 1 initially. After the first full pass, 99 is moved into it and never accessed again.

28. Correct Answer: C
The value of j and the contents of the my_numb array after each pass are:

```
J = 0
8 7 9 14 28 5 3 14 1 99
J = 1
7 8 9 14 5 3 14 1 28 99
J = 2
7 8 9 5 3 14 1 14 28 99
J = 3
7 8 5 3 9 1 14 14 28 99
J = 4
7 5 3 8 1 9 14 14 28 99
J = 5
5 3 7 1 8 9 14 14 28 99
J = 6
3 5 1 7 8 9 14 14 28 99
J = 7
3 1 5 7 8 9 14 14 28 99
J = 8
1 3 5 7 8 9 14 14 28 99
```
When j = 5, my_numb [5] is 9.

29. Correct Answer: B
The array has 10 elements, indexed from 0 to 9. 9 is the highest index that should be used for the array.

30. Correct Answer: C
When j = 2, line 6 will be executed 3 times. The first swap is made when i = 4, the next when i = 5, and the final swap is made when i = 7.
```
i = 1    7 8 9 14 5 3 14 1 28 99
i = 2    7 8 9 14 5 3 14 1 28 99
i = 3    7 8 9 14 5 3 14 1 28 99
i = 4    7 8 9 5 14 3 14 1 28 99
i = 5    7 8 9 5 3 14 14 1 28 99
i = 6    7 8 9 5 3 14 14 1 28 99
i = 7    7 8 9 5 3 14 1 14 28 99
```