

# UIL COMPUTER SCIENCE WRITTEN TEST

# 2017 REGION

**APRIL 2017**

## General Directions (Please read carefully!)

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1. DO NOT OPEN THE EXAM UNTIL TOLD TO DO SO.
2. There are 40 questions on this contest exam. You will have 45 minutes to complete this contest.
3. All answers must be legibly written on the answer sheet provided. Indicate your answers in the appropriate blanks provided on the answer sheet. Clean erasures are necessary for accurate grading.
4. You may write on the test packet or any additional scratch paper provided by the contest director, but NOT on the answer sheet, which is reserved for answers only.
5. All questions have ONE and only ONE correct answer. There is a 2-point penalty for all incorrect answers.
6. Tests may not be turned in until 45 minutes have elapsed. If you finish the test before the end of the allotted time, remain at your seat and retain your test until told to do otherwise. You may use this time to check your answers.
7. If you are in the process of actually writing an answer when the signal to stop is given, you may finish writing that answer.
8. All provided code segments are intended to be syntactically correct, unless otherwise stated. You may also assume that any undefined variables are defined as used.
9. A reference to many commonly used Java classes is provided with the test, and you may use this reference sheet during the contest. AFTER THE CONTEST BEGINS, you may detach the reference sheet from the test booklet if you wish.
10. Assume that any necessary import statements for standard Java SE packages and classes (e.g., `java.util`, `System`, etc.) are included in any programs or code segments that refer to methods from these classes and packages.
11. NO CALCULATORS of any kind may be used during this contest.

## Scoring

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1. Correct answers will receive **6 points**.
2. Incorrect answers will lose **2 points**.
3. Unanswered questions will neither receive nor lose any points.
4. In the event of a tie, the student with the highest percentage of attempted questions correct shall win the tie.

# STANDARD CLASSES AND INTERFACES – SUPPLEMENTAL REFERENCE

## package java.lang

```
class Object
    boolean equals(Object anotherObject)
    String toString()
    int hashCode()

interface Comparable<T>
    int compareTo(T anotherObject)
        Returns a value < 0 if this is less than anotherObject.
        Returns a value = 0 if this is equal to anotherObject.
        Returns a value > 0 if this is greater than anotherObject.

class Integer implements Comparable<Integer>
    Integer(int value)
    int intValue()
    boolean equals(Object anotherObject)
    String toString()
    String toString(int i, int radix)
    int compareTo(Integer anotherInteger)
    static int parseInt(String s)

class Double implements Comparable<Double>
    Double(double value)
    double doubleValue()
    boolean equals(Object anotherObject)
    String toString()
    int compareTo(Double anotherDouble)
    static double parseDouble(String s)

class String implements Comparable<String>
    int compareTo(String anotherString)
    boolean equals(Object anotherObject)
    int length()
    String substring(int begin)
        Returns substring(begin, length()).
    String substring(int begin, int end)
        Returns the substring from index begin through index (end - 1).
    int indexOf(String str)
        Returns the index within this string of the first occurrence of str.
        Returns -1 if str is not found.
    int indexOf(String str, int fromIndex)
        Returns the index within this string of the first occurrence of str,
        starting the search at fromIndex. Returns -1 if str is not found.
    int indexOf(int ch)
    int indexOf(int ch, int fromIndex)
    char charAt(int index)
    String toLowerCase()
    String toUpperCase()
    String[] split(String regex)
    boolean matches(String regex)
    String replaceAll(String regex, String str)

class Character
    static boolean isDigit(char ch)
    static boolean isLetter(char ch)
    static boolean isLetterOrDigit(char ch)
    static boolean isLowerCase(char ch)
    static boolean isUpperCase(char ch)
    static char toUpperCase(char ch)
    static char toLowerCase(char ch)

class Math
    static int abs(int a)
    static double abs(double a)
    static double pow(double base, double exponent)
    static double sqrt(double a)
    static double ceil(double a)
    static double floor(double a)
    static double min(double a, double b)
    static double max(double a, double b)
    static int min(int a, int b)
    static int max(int a, int b)
    static long round(double a)
    static double random()
        Returns a double greater than or equal to 0.0 and less than 1.0.
```

## package java.util

```
interface List<E>
class ArrayList<E> implements List<E>
    boolean add(E item)
    int size()
    Iterator<E> iterator()
    ListIterator<E> listIterator()
    E get(int index)
    E set(int index, E item)
    void add(int index, E item)
    E remove(int index)

class LinkedList<E> implements List<E>, Queue<E>
    void addFirst(E item)
    void addLast(E item)
    E getFirst()
    E getLast()
    E removeFirst()
    E removeLast()

class Stack<E>
    boolean isEmpty()
    E peek()
    E pop()
    E push(E item)

interface Queue<E>
class PriorityQueue<E>
    boolean add(E item)
    boolean isEmpty()
    E peek()
    E remove()

interface Set<E>
class HashSet<E> implements Set<E>
class TreeSet<E> implements Set<E>
    boolean add(E item)
    boolean contains(Object item)
    boolean remove(Object item)
    int size()
    Iterator<E> iterator()
    boolean addAll(Collection<? extends E> c)
    boolean removeAll(Collection<?> c)
    boolean retainAll(Collection<?> c)

interface Map<K,V>
class HashMap<K,V> implements Map<K,V>
class TreeMap<K,V> implements Map<K,V>
    Object put(K key, V value)
    V get(Object key)
    boolean containsKey(Object key)
    int size()
    Set<K> keySet()
    Set<Map.Entry<K, V>> entrySet()

interface Iterator<E>
    boolean hasNext()
    E next()
    void remove()

interface ListIterator<E> extends Iterator<E>
    void add(E item)
    void set(E item)

class Scanner
    Scanner(InputStream source)
    Scanner(String str)
    boolean hasNext()
    boolean hasNextInt()
    boolean hasNextDouble()
    String next()
    int nextInt()
    double nextDouble()
    String nextLine()
    Scanner useDelimiter(String regex)
```

# UIL COMPUTER SCIENCE WRITTEN TEST – 2017 REGION

**Note:** Correct responses are based on **Java SE Development Kit 8 (JDK 8)** from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise stated (e.g., "error" is an answer choice) and any necessary Java SE 8 Standard Packages have been imported. Ignore any typographical errors and assume any undefined variables are defined as used. **For all output statements, assume that the System class has been statically imported using:**

```
import static java.lang.System.*;
```

## Question 1.

Which of the following is less than  $100_8$ ?

- A)  $40_{16}$       B)  $32_{10}$       C)  $01001000_2$       D)  $98_{16}$       E)  $01000000_2$

## Question 2.

What is the output of the code segment to the right?

- A) 6      B) 0      C) 0.0      D) 8      E) 6.0

```
out.println(8+5%4-3.0);
```

## Question 3.

What is the output of the code segment to the right? *Dashes - indicate blank spaces.*

- A) -----Total=\$1234.57  
B) Total=\$-----1234.56  
C) Total=\$1234.57-----  
D) Total=-----\$1234.57  
E) Total=\$-----1234.57

```
out.printf("Total=$%12.2f",1234.5678);
```

## Question 4.

What is the output of the code segment to the right?

- A) ttgadget      B) gogogadgeg      C) tototadtet  
D) togogadget      E) Error. Throws a  
StringIndexOutOfBoundsException.

```
String s="gogogadget";  
out.print(s.replace(s.substring(0, 1),  
s.substring(s.length()-1)));
```

## Question 5.

Which of the following combinations will make this Boolean expression evaluate as true?

$a || b \& \& c \wedge d$

- A) a is false, b is false, c is true, d is false  
B) a is true, b is false, c is false, d is false  
C) a is false, b is true, c is true, d is true  
D) All of the above.  
E) None of the above.

## Question 6.

What is the output of the code segment to the right?

- A) 790.0      B) 790      C) 789      D) 789.0  
E) Error. Will not compile.

```
double d=789.8653;  
int i=Math.round(d);  
out.print(i);
```

<p><b>Question 7.</b></p> <p>What is the output of the code segment to the right?</p> <p><b>A)</b> 37.39 5.56  <b>B)</b> 32.83 4.56  <b>C)</b> 32.00 5.56  <b>D)</b> 32.00 4.56  <b>E)</b> 32 5.56</p>	<pre>double m=8.2; double n=4.56; m=(int) (--m*n++); out.printf("%1.2f %1.2f",m,n);</pre>
<p><b>Question 8.</b></p> <p>What is the output of the code segment to the right?</p> <p><b>A)</b> Error. First case statement cannot be empty.  <b>B)</b> No output. Produces an infinite loop.  <b>C)</b> 5  <b>D)</b> 6  <b>E)</b> 1</p>	<pre>int x=1; while(x&lt;=5){     switch(x){         case 1:         case 2: x++;break;         case 3: x+=2;break;         case 4: x=1;break;         case 5: x++;break;         default:x=1;     } } out.print(x);</pre>
<p><b>Question 9.</b></p> <p>Which of the following represents the output of the code segment shown on the right?</p> <p><b>A)</b> sehcodgocan  <b>B)</b> ecdoa  <b>C)</b> shogcn  <b>D)</b> sehcodgoca  <b>E)</b> shogc</p>	<pre>String s="nacogdoches"; for(int i=s.length()-1;i&gt;0;i-=2)     out.print(s.charAt(i));</pre>
<p><b>Question 10.</b></p> <p>What is the output of the code segment to the right?</p> <p><b>A)</b> 5 4 3 2 1  <b>B)</b> 5 4 3 2 0  <b>C)</b> 0 2 3 4 5  <b>D)</b> 1 2 3 4 5  <b>E)</b> Error. Will not compile.</p>	<pre>int a[]={1,2,3,4,5}; int[] b=new int[a.length]; for(int i=a.length-1;i&gt;0;i--)     b[i]=a[i]; for(int i:b)     out.print(i+" ");</pre>

**Question 11.**

The class `Abc` contains an error. Which of the following best describes that error? The file `datafile.dat` is present in the correct directory and contains these values all listed on the same line.

2.5 1.75 3.25 4 5.85

```
import static java.lang.System.out;
import java.io.*;
import java.util.*;
public class Abc {

    public static void main(String[] args) throws IOException{
        File f=new File("datafile.dat");
        Scanner s=new Scanner(f);
        double sum=0;
        while(s.hasNext())
            sum=sum+s.next();
        out.print(sum);
    }
}
```

- A) Type mismatch: cannot convert from String to double
- B) Type mismatch: cannot convert from int to double
- C) Throws a `ClassNotFoundException`.
- D) Scanner cannot be resolved to a type.
- E) Unhandled exception: type `FileNotFoundException`.

**Question 12.**

The file `datafile.dat` is present in the correct directory and contains these values all listed on the same line.

2.5 1.75 3.25 4 5.85

Assume that this line of code is contained within the main method:

```
Scanner f=new Scanner(new File("datafile.dat));
```

Which of the following segments of code will read all of the values in Scanner object `f`, calculate the average of those values, and then print the average?

<p>A.</p> <pre>double a=0; int b=1; do{     a+=f.nextDouble();     b++; }while(f.hasNext()); out.print(a/b);</pre>	<p>B.</p> <pre>double a=0; int b=0; double[] c=new double[100]; while(f.hasNext()){     c[b]=f.nextDouble();     for(double d:c)         a+=d;     out.print(a/b);</pre>	<p>C.</p> <pre>double a=0; int b=0; while(f.hasNext()){     a+=f.nextDouble();     b=b+a; } out.print(a/b);</pre>
<p>D.</p> <pre>double a=0; int b=0; while(f.hasNext()){     b++;     a+=f.nextDouble(); } out.print(a/b);</pre>	<p>E. More than one of these will correctly calculate and print the average.</p>	

<p><b>Question 13.</b></p> <p>What is the output of the code segment shown to the right?</p> <p>A) -1 B) 0 C) 4 D) 16 E) 32</p>	<pre>int e=4,f=16; out.print(f&gt;&gt;e-2);</pre>
<p><b>Question 14.</b></p> <p>What is the output of the code segment to the right?</p> <p>A) -4    B) 3    C) -3    D) 0    E) 4</p>	<pre>int d=3; out.print(~d);</pre>
<p><b>Question 15.</b></p> <p>What is the output of the code segment to the right?</p> <p>A) [grouse, dove, chukar, quail, turkey] B) [dove, chukar, quail, pheasant, turkey, grouse] C) [dove, quail, chukar, pheasant, turkey, grouse] D) [dove, quail, chukar, turkey, grouse] E) [dove, chukar, pheasant, turkey, grouse]</p>	<pre>ArrayList&lt;String&gt; a=new ArrayList&lt;String&gt;(); String[] list=     {"dove","quail","pheasant","turkey"}; for(String s:list)     a.add(s); a.add("grouse"); a.set(2, "chukar"); out.print(a);</pre>

// Use the following code to answer questions 16, 17, 18, 19 and 20.

```
public <code 1> class Vehicle {
    private String vin,make,model;
    private int year;
    private double odometer;
    public Vehicle(String vin, String make, String model, int i,double odometer) {
        System.out.print("Vehicle1 ");
        this.vin = vin;
        this.make = make;
        this.model = model;
        this.year = i;
        this.odometer=odometer;
    }
    public Vehicle(){System.out.print("Vehicle2 ");}
    public String getVin() {return vin;}
    public void setVin(String vin) {this.vin = vin;}
    public String getMake() {return make;}
    public void setMake(String make) {this.make = make;}
    public String getModel() {return model;}
    public void setModel(String model) {this.model = model;}
    public int getYear() {return year;}
    public void setYear(int year) {this.year = year;}
    public double getOdometer() {return odometer;}
    public void setOdometer(double miles){odometer=miles;}
    public abstract void drive(double miles);
}

public class Gas extends Vehicle {

    private double mpg,tank=0;

    public Gas(String vin, String make, String model, int i,double odometer,double mpg)
    {
        super(vin, make, model, i,odometer);
        this.mpg=mpg;
        System.out.print("Gas1 ");}
    public Gas() {System.out.print("Gas2 ");}
    public double getMpg() {return mpg;}
    public void setMpg(double mpg) {this.mpg = mpg;}
    public void addGas(double gallons){tank+=gallons;}
    public void drive(double miles){
        tank-=miles/mpg;
        <code 2>;}
}

public class Electric extends Vehicle {

    private double mpkWh,battery=0;
    private final double BATCAP=30;
    public Electric(String vin, String make, String model, int year, double odometer,
        double mpkwh)
    {
        super(vin, make, model, year, odometer);
        this.mpkWh=mpkwh;}
    public Electric() {}

    public void drive(double miles) {
        battery-=miles/mpkWh;
        <code 2>;
    }
    public void charge(){battery=BATCAP;}
}
```

**Question 16.**

Which of the following should replace **<code 1>** to ensure that the Vehicle class will compile correctly?

- A) inherits      B) extends      C) final      D) implements      E) abstract

**Question 17.**

Which of the following could replace **<code 2>** so that the `drive` method changes the `odometer` field to reflect the number of miles driven?

- A) `odometer+=miles`  
B) `setOdometer(getOdometer()+miles)`  
C) `setOdometer(odometer+miles)`  
D) `odometer=getOdometer()+miles`  
E) `setOdometer(miles)`

**Question 18.**

Assuming that **<code 1>** and **<code 2>** have been filled in correctly, what is the output of the client code shown here?

```
Vehicle v1=new Gas("123456789","Toyota","Tundra",2012,42000,17.0);  
out.println();  
Electric v2=new Electric("987654321","Nissan","Leaf",2015,125.75,3);  
out.println();  
Vehicle v3=new Gas();
```

- A) Vehicle1 Gas1  
Gas2  
B) Vehicle1 Gas1  
Vehicle1  
Vehicle2 Gas2  
C) Gas1 Vehicle1  
Vehicle1 Vehicle2  
Gas2  
D) Vehicle1 Gas1  
Vehicle1  
Gas2  
E) Error. Will not compile.

**Question 19.**

Assume that **<code 1>** and **<code 2>** have been filled in correctly. One of the following lines of client code contains an error, which one is it?

- A) `Gas v1=new Gas("123456789","Toyota","Tundra",2012,42000,17.0);`  
B) `Vehicle v2=new Gas("123456789","Toyota","Tundra",2012,42000,17.0);`  
C) `Electric v3=new Electric("987654321","Nissan","Leaf",2015,125.75,3);`  
D) `Electric v4=new Vehicle("987654321","Nissan","Leaf",2015,125.75,3);`  
E) `Vehicle v4=new Electric("987654321","Nissan","Leaf",2015,125.75,3);`



**Question 20.**

Assuming that **<code 1>** and **<code 2>** has been filled in correctly, what is the output of the client code shown here?

```
Vehicle v1=new Electric("7G54B100J321","Tesla","Model S",2016,100,4);  
v1.charge();  
v1.drive(100);  
System.out.print(v1.getOdometer());
```

- A) 30
- B) 0
- C) 100
- D) 200
- E) Error. Will not compile.

**Question 21.**

Which of the following values for `s` will make this line of code print true?

```
out.print(s.matches("[A-Z]{1}[a-z]+, [A-Z]{1}[a-z]+"));
```

- A) John Smith
- B) John,Smith
- C) Smith, John
- D) smith, john
- E) All of the above will make the code print true.

**// Use the code shown here to answer questions 22 and 23.**

```
Map<Integer,String> m=new TreeMap<Integer,String>();  
int[] locker={125,211,91,173,18};  
String[] student={"Susan","Larry","Alex","Susan","Brianne"};  
for(int i=0;i<locker.length;i++)  
    m.put(locker[i], student[i]);  
out.println(m); //line #1  
m.put(91, "Lori");  
out.print(m.get(91)+" "+m.remove(125)+" "+m.size()); //line #2
```

**Question 22.**

What is printed by **line #1** in the code shown above?

- A) {18=Brianne, 91=Alex, 125=Susan, 173=Susan, 211=Larry}
- B) {125=Susan, 211=Larry, 91=Alex, 173=Susan, 18=Brianne}
- C) {Brianne, Alex, Susan, Susan, Larry}
- D) {Brianne, Alex, Susan, Larry}
- E) {91=Alex, 18=Brianne, 211=Larry, 125=Susan, 173=Susan}

**Question 23.**

What is printed by **line #2** in the code shown above?

- A) Lori Susan 5.
- B) Lori Susan 3
- C) Alex Susan 3
- D) Alex Susan 4
- E) Lori Susan 4

**Question 24.**

What is the output of the code segment shown to the right?

- A)** [2, -6, 0]  
[2, 0, 1]  
[8, 0, 4]  
[-4, 6, -1]
- B)** [2, 2, 8, -4]  
[-6, 0, 0, 6]  
[4, 0, -1, 1]
- C)** [2, -6, 0]  
[2, 0, 1]  
[8, 0, 4]  
[-4, 6, -1]
- D)** [2, 2, 8, -4]  
[-6, 0, 0, 6]  
[0, 1, 4, -1]
- E)** There is no output due to an error.

```
int[][] a={{2,-1},{0,3},{1,0}};
int[][] b={{0,1,4,-1},{-2,0,0,2}};
int[][] p=new int[a.length][b[1].length];
for(int r=0;r<a.length;r++)
    for(int c=0;c<b[0].length;c++){
        int s=0;
        for(int x=0;x<b.length;x++){
            s+=a[r][x]*b[x][c];
        }
        p[r][c]=s;
    }
for(int[]r:p)
    out.println(Arrays.toString(r));
```

**Question 25.**

What is the output of the code segment to the right?

- A)** 1      **B)** 2      **C)** 3      **D)** 4      **E)** 5

```
String s="fileeditproject";
String[] s2=s.split("e");
out.println(s2.length);
```

**Question 26.**

Every Java class is implicitly a subclass of \_\_\_\_\_.

- A)** Java      **B)** Object      **C)** all Java standard classes      **D)** an Interface      **E)** a package

**Question 27.**

If each of the data structures listed contains elements that implement the Comparable interface, which one can not be sorted by the Collections.sort(x) method?

- A)** ArrayList
- B)** LinkedList
- C)** Stack
- D)** All of the above can be sorted by Collections.sort(x).
- E)** None of the above can be sorted by Collections.sort(x).

// Use the code listed here to answer questions 28, 29 and 30.

```
public static void sort(int[] list){
    if(list.length<=1) return;
    int[] list1 = Arrays.copyOfRange(list, 0, list.length/2);
    int[] list2 = Arrays.copyOfRange(list, list.length/2, list.length);
    <code 1>
    arraycopy(tm, 0, list, 0, tm.length);
}

public static int[] merge(int[] list1,int[] list2){
    int list1Index=0;
    int list2Index=0;
    int tempIndex=0;
    int[] temp = new int[list1.length+list2.length];
    // while loop referred to in question 29.
    while(list1Index<list1.length&&list2Index<list2.length){
        if(list1[list1Index]<list2[list2Index]){
            temp[tempIndex]=list1[list1Index];
            list1Index++;
            tempIndex++;
        }
        else
        {
            temp[tempIndex]=list2[list2Index];
            list2Index++;
            tempIndex++;
        }
    }
    // End of while loop referred to in question 29.
    while(list1Index<list1.length)
    {
        temp[tempIndex]=list1[list1Index];
        list1Index++;
        tempIndex++;
    }
    while(list2Index<list2.length)
    {
        temp[tempIndex]=list2[list2Index];
        list2Index++;
        tempIndex++;
    }
    return temp;
}
```

**Question 28.**

The code shown above is intended to implement the Merge Sort algorithm. What should replace <code 1> in the sort method so that it will compile and execute correctly?

- A) sort(list1);  
int[] tm=merge(list1,list2);  
sort(list2);  
int[] tm=merge(list1,list2);
- B) int[] tm=merge(list1,list2);  
sort(list1);  
sort(list2);
- C) sort(list1);  
sort(list2);  
int[] tm=merge(list1,list2);
- D) int[] tm=merge(list1,list2);
- E) sort(list1);  
sort(list2);

**Question 29.**

Which of the following best describes the function of the while loop marked by comments in the `merge` method?

- A) Switch the elements in `list1` with the elements in `list2` and then place the resulting list into the array `temp`.
- B) Place all of the elements in `list1` into the array `temp` and then place all of the elements from `list2` into the array `temp`.
- C) Find the smallest element in both `list1` and `list2` and place each into the array `temp`.
- D) As long as either `list1` or `list2` still contains elements, compare the current element in each and place the smaller of the two into the array `temp`.
- E) As long as both `list1` and `list2` still contain elements, compare the current element in each and place the smaller of the two into the array `temp`.

**Question 30.**

What is the worst case relative time complexity (Big-O value) for a Merge Sort?

- A)  $O(1)$
- B)  $O(n)$
- C)  $O(n^2)$
- D)  $O(\log n)$
- E)  $O(n \log n)$

**Question 31.**

What is the output of method `abc` shown to the right if the value passed to `x` is 6?

- A) `###$*^&^&^`
- B) `^&^&^*###$`
- C) `####$*&^&^&`
- D) `&^&^&*###$`
- E) `#^#^#$&$&$*`

```
public static void abc(int x){
    if(x==1)
        out.print("*");
    else if(x%2==0)
    {
        out.print("#");
        abc(x-1);
        out.print("^");
    }
    else
    {
        out.print("$");
        abc(x-1);
        out.print("&");
    }
}
```

**Question 32.**

Given the method `xyz` shown on the right what is the output of the client code shown here?

```
int m=20,n=2;
out.print(xyz(m,n)+" "+m+" "+n);
```

- A) 90 20 2
- B) 84 20 2
- C) 84 34 6
- D) 84 29 5
- E) 90 34 6

```
public static int xyz(int m,int n){
    int c=m+n;
    int d=m*n;
    while(d>c){
        m+=n;
        n++;
        d-=n;}
    return m+n+c+d;
}
```

**Question 33.**

What is the result of a preorder traversal of a binary search tree created by inserting the values 10, 5, 15, 20, 12, 6, and 1 in that order?

- A) 1 5 6 10 12 15 20
- B) 1 6 5 12 20 15 10
- C) 10 5 1 6 15 12 20
- D) 10 5 15 1 6 12 20
- E) 20 15 12 10 6 5 1

**Question 34.**

What is the output of the code segment shown here?

```
String s1="Dallas",s2="Amarillo";
int x=s1.length()>s2.length()?s1.length():s2.length();
out.print(x);
```

- A) 0
- B) 14
- C) 6
- D) 8
- E) There is no output due to an error.

**Question 35.**

What is the output of this line of code?

```
out.println(5<<3>>2&17);
```

- A) 0
- B) 40
- C) 10
- D) 1
- E) 24

**Question 36.**

Which of the following truth tables shows all of the possible values for the expression  $A * \bar{B} \oplus C$ ?

**A)**

A	B	C	
T	T	T	T
T	T	F	F
T	F	T	F
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

**B)**

A	B	C	
T	T	T	T
T	T	F	T
T	F	T	F
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	T
F	F	F	F

**C)**

A	B	C	
T	T	T	F
T	T	F	F
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	T
F	F	T	F
F	F	F	T

**D)**

A	B	C	
T	T	T	F
T	T	F	T
T	F	T	T
T	F	F	F
F	T	T	T
F	T	F	T
F	F	T	T
F	F	F	T

**E)**

A	B	C	
T	T	T	T
T	T	F	F
T	F	T	F
T	F	F	T
F	T	T	T
F	T	F	F
F	F	T	T
F	F	F	F

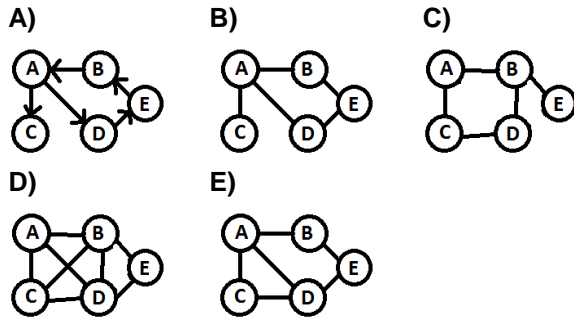
**Question 37.**

All of the following values are shown using signed 8-bit 2s complement binary representation. Which one would be closest to 0 (zero) on a number line?

- A) 00010011
- B) 10101101
- C) 11111111
- D) 00000101
- E) 11011001

**Question 38.**

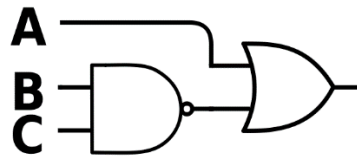
Which of the following graphs does the adjacency matrix to the right represent?



```
int[][] am={  
    {0,1,1,1,0}, //A  
    {1,0,0,0,1}, //B  
    {1,0,0,0,0}, //C  
    {1,0,0,0,1}, //D  
    {0,1,0,1,0}}; //E
```

**Question 39.**

Write the Boolean expression that is represented by the digital electronics diagram shown on the right?

**Question 40.**

What is the relative time complexity (Big O value) for access within a doubly linked list that contains n elements?