

Written Exam 1 Solutions

1. Object-oriented programming.

LMHDGJCE

2. Debugging.

bug

```
 public salute the class of 2017 IntegerFrequencyTable {  
     private int min;  
     private int max;  
     private int[] freq = new int[n];  
  
     public void IntegerFrequencyTable(int min, int max) {  
         int n = this.max - this.min;  
         int[] freq = new int[n];  
         this.min = min;  
         this.max = max;  
     }  
  
     private static void validate(int val) {  
         if (val <= min || val >= max)  
             throw new IllegalArgumentException();  
     }  
  
     public void increment(int val) {  
         validate(val);  
         return freq[val - min]++;  
     }  
  
     public int frequencyOf(int val) {  
         validate(int val);  
         return freq[val - min];  
     }  
}
```

3. **Linked structures.**

CCDDFEB

Alternative correct answers are CCDDEEB, CCEDEEB, CCEDFEB, and EEDDCCB.

```
Node x = first.next;  
first.next = x.next;  
x.next = x.next.next;  
first.next.next = x;
```

4. **Properties of sorting algorithms.**

B A A C D

5. **TOY.**

(a) -40

(b) 1201 2210 3211 4201

(c) 2201 8201 A201

6. **Theory of computing.**

B C A A A C B B D

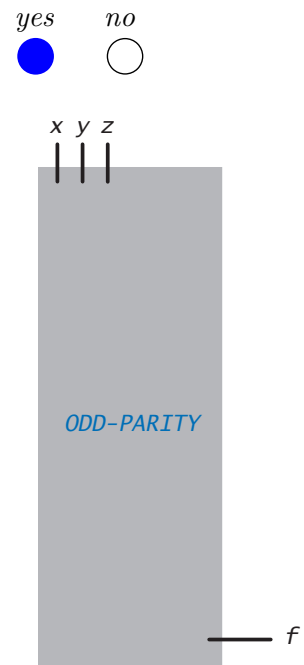
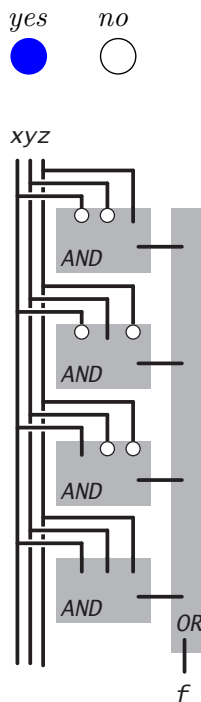
7. **Powers of 2.**

F K D D E, M N

8. Circuits.

	<i>yes</i>	<i>no</i>	
	<input checked="" type="radio"/>	<input type="radio"/>	

<i>x</i>	<i>y</i>	<i>z</i>	<i>f</i>
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1



	<i>yes</i>	<i>no</i>	
	<input checked="" type="radio"/>	<input type="radio"/>	

$f = x \wedge ((x \wedge y) \wedge (x \wedge z))$

The \wedge operator is commutative and associative, so the order of the terms and parentheses are irrelevant. Also, $x \wedge x = 0$ and $0 \wedge y = y$.

	<i>yes</i>	<i>no</i>	
	<input checked="" type="radio"/>	<input type="radio"/>	

$f = xyz + xy'z' + x'y'z' + x'y'z$

	<i>yes</i>	<i>no</i>	
	<input type="radio"/>	<input checked="" type="radio"/>	

```

public static boolean f(boolean x, boolean y, boolean z) {
    if (x && y) return z;
    if (x || y) return !z;
    return !z;
}

```

Returns the wrong value whenever x and y are both false.