1

```
function f(A,B)
  C = 0
  while B > 0 do
    C = C + A * (B mod 2)
    A = A * 2
    B = B / 2
  return C
```

Let A, B, and C be integers. If A and B is natural numbers, what will function f(A,B) return?

A. A power B
B. Multiplication of A and B
C. Greatest Common Divisor (GCD) of A and B
D. Partial sum of natural number from A to B
E. Least Common Multiple (LCM) of A and B

2

```
function f(a,b)
  if b = 0 then
    return 0
  else
    if b is odd then
      return f(2*a, b/2) + a
    else
      return f(2*a, b/2)
```

Let a, b, and c be integers. What is the result of f(105,27)?

A. 2575
B. 2835
C. 935
D. 0
E. Error! Infinite Recursive Call

3

```
procedure sort(A[1..n])
  for i = 1 to n - 1 do
    for j = 1 to n - i do
      if A[j] > A[j+1] then
        swap A[j] with A[j+1]
```

The pseudocode above is one of the well known sorting algorithm, what is the name?

A. Insertion Sort
B. Quick Sort
C. Selection Sort
D. Bubble Sort
E. Merge Sort

4

```
procedure sort(A[1..n])
  if |A| <= 1 then
    return A
  else
    Choose an element x from S
    Let S1 be the element of S that are smaller than x
    Let S2 be the element of S that are bigger x
    return sort(S1), S2, sort(S2)
```

The pseudocode above is one of the well known sorting algorithm, what is the name?

a. Insertion Sort
b. Quick Sort
c. Selection Sort
d. Bubble Sort
e. Merge Sort

5

What will the following function do?

```
function f(N)
  if N <= 0 then
    return 0
  else
    return f(N-1) + N
```

A. Factorial of N
B. N-th Prime Number
C. Sum of natural number up until N
D. N-th even number
E. Infinite loop

6

```
function f(n)
  if n = 0 then
    return 0
  else
    a = 0
    b = 1
    for i = 2 to n do
      c = a + b
      a = b
      b = c
  return b
```

Let a, b, c, and n be integers. What will f(N) return?

a. Factorial of N
b. N-th Fibbonaci number
c. N-th Prime number
d. N-th Erdos number
e. N-th Odd number

7

What this pseudocodes do?

```
A = 83
for i = 0 to 4 do
  B = A XOR 1
  A = A / 2
  print B
```

A. Print: 824021114
B. Print: 411214082
C. Print: 824120105
D. Print: 510204182
E. Print: 824121114

8

Look at the following pseudocode:

```
x = 0
for i = 1 to 9 do
  for j = 11 to 19 do
    for k = 1 to 19 do
      x = x + 1
print x
```

What will be printed by the pseudocode above?

A. 1539
B. 729
C. 37
D. 2000
E. 1800

9

```
i = 0
while i < 10 do
begin
  j = i
  while j < 30 do
  begin
    print j
    j = j + 1
  end
  i = i + 1
end
```

How many times j will be printed?

A. 255
B. 300
C. 274
D. 275
E. 301

10

```
function f(n)
  if n = 0 then
    return 1
  else
    if n mod 2 = 1 then
      return 2 * f(n/2)
    else
      return n + 1
```

Let n be integer. What will f(1025) return?

A. 1026
B. 513
C. 512
D. 1024
E. 1

11

```
function f(y,z)
  x = 1
  while z > 0 do
  begin
    if z is odd then
    begin
      x = x * y
    end
    z = z / 2
    y = y * y
  end
  return x
```

What will f(3,4) return?

A. 1
B. 9
C. 4
D. 16
E. 81

12

```
function f(n)
  if n <= 1 then
    return n
  else
    return f(n-1) + f(n-2)
```

How many times will the recursive function f(n) be called if it's invoked by f(8)?
(including the initial call f(8))

A. 34
B. 55
C. 67
D. 68
E. 69

13

```
function f(n)
  r = 0
  for i = 1 to n do
    for j = 1 to i do
      for k = j to i + j do
        r = r + 1
  return r
```

What is the result of f(7)?

A. 78
B. 127
C. 158
D. 168
E. 240

14

```
x = 0
for i = 1 to n do
  for j = i to n do
    for k = i to n do
      x = x + 1
print x
```

What will be printed by the pseudocode above (n=10)?

A. 275
B. 385
C. 550
D. 220
E. 285

15

```
S[1..5] = { 2, 4, 7, 9, 12 }

function f(x,y)
  if y - x <= 1 then
    if S[x] > S[y] then
      return S[x]
    else
      return S[y]
  else
    r = (x + y) / 2
    p = f(x,r)
    q = f(r+1,y)
    if p < q then
      return q
    else
      return p
```

What is the result of f(1,4)?

A. 2
B. 4
C. 7
D. 9
E. 12

16

```
x = 0

function f()
  x = x + 1

function g()
  f()
  f()

function h()
  f()
  g()
  f()

main()
  f()
  print x
  g()
  print x
  h()
  print x
```

What will be printed by the pseudocode above?

A. 1 3 7
B. 1 3 6
C. 0 2 6
D. 0 2 5
E. 1 2 7

17

```
if A AND B
  if (not C) OR (not D)
    print '1'
  else if D
    print '2'
  else
    print '3'
else
  if C <> D
    print '4'
  else if C
    print '5'
  else
    print '6'
```

If A = B = C, and C = false, and A <> D, what will be printed by the pseoudocode above?

```
A. 2
B. 3
C. 4
D. 5
E. 6
```

18

```
The worst case complexity for Selection Sort algorithm is:

A. n^3
B. n . log(n)
C. n^2
D. 2^n
E. n
```

19

```
Which of the following data structures is the fastest for retrieving data?

A. Binary Index Tree
B. Binary Tree
C. Stack
D. Queue
E. Hash Table
```

20

```
Which of the following algorithm will be the first one to finish processing 1,000,000
element array (in the worst case scenario)?

A. Quick Sort
B. Linear Search
C. Merge Sort
D. Bubble Sort
E. Heap Sort
```

21

```
Let A, B, C, and D be matrices whose dimensions are:
A (2 x 4)
B (4 x 3)
C (3 x 1)
D (1 x 5)

What is the best way to multiply A x B x C x D (one with the smallest number of
operations)?

A. ( A x ( B x C ) ) x D
B. ( ( A x B ) x C ) x D
C. A x ( B x ( C x D ) )
D. A x ( ( B x C ) x D )
E. ( A x B ) x ( C x D )
```

22

If you put 1, 3, 5, 9, 7 (in that order) into a stack, which number will be poped out last?

A. 1
B. 3
C. 5
D. 9
E. 7

23

What is the result of the following expression?

6 - 5 - 4 * 3 / 2 + 1

A. -3
B. -2
C. 6
D. 1
E. -4

24

```
function f(n)
  if n <= 1 then
    return 1
  else if n mod 2 = 0 then
    return f(n/2)
  else
    return f(3*n+1)
```

How many times will the recursive function f(n) be called if it's invoked by f(3)? (including the initial call f(3))

A. 7
B. 8
C. 9
D. 10
E. 11

25

```
if (i = 3) OR (j = 4) then
  print "YES"
else
  print "NO"
```

Are there any possibilities that the pseudocode will print both YES and NO in the same time?

A. No, there are no possibilities.
B. Yes, there are. Only one possibilities.
C. Yes, there are. Many possibilities.

```
D. Yes, there are. Depends on compiler setting.
E. Yes, there are. There are two possibilities.
```

26

```
It's BINUS Festival Day and you have a schedule of events:

 9:00 -  9:45 Pop Band
 9:30 - 10:00 Short Movie Theater
 9:50 - 10:15 Chorus
10:00 - 10:30 Pongo Dance
10:10 - 10:25 Math Quiz
10:30 - 10:55 Wushu Demonstration
10:15 - 10:45 Poco Poco Dance
10:30 - 11:00 Programming Tutorial
10:45 - 11:30 Game Zone
10:55 - 11:25 Magician Show
11:00 - 11:15 Barongsai Dance

Naturally, you want to attend as many events as you can.
What is the largest set of nonoverlapping events?

A. 2
B. 3
C. 4
D. 5
E. 6
```

27

```
function f(a,b,c)
  if (a = TRUE) AND (b = TRUE) then
    print '1'
  else
    if (b = FALSE) then
      print '2'
    else if (c = TRUE) then
      print '3'
    else
      if (a = TRUE) and (b = FALSE) then
        print '4'
      else
        print '5'


What will be printed by f(FALSE,TRUE,TRUE)?

A. 1
B. 2
C. 3
D. 4
E. 5
```

28

```
What will be printed by the following pseudocode?

S[1..5] = { 2, 8, 3, 6, 7 }
```

```
for x = 1 to 2 do
  for y = 1 to 4 do
    if S[x] < S[x+1] then
        z = S[x]
        S[x] = S[x+1]
        S[x+1] = z

print S[2]
```

A. 2
B. 8
C. 3
D. 6
E. 7

29

The following pseudocode will swap value x and y, except:

```
A. x = x + y
   y = x - y
   x = x - y

B. x = x XOR y
   y = y XOR x
   x = x XOR y

C. x = x * y
   y = x / y
   x = x / y

D. z = x
   x = y
   y = z

E. x = x + y
   x = x - y
   y = y - x
```

30

What will be printed by the following pseudocode?

```
S[1..7] = { 3, 1, 9, 7, 0, 4, 3 }

x = 0
for i = 1 to 7 do
  for j = i + 1 to 7 do
    x = x + S[j]

print x
```

A. 87
B. 90
C. 94
D. 97
E. 101

31

Let S = { 2, 3, 4, 5, 6, 10 }. How many non-empty set S' are there, such that S' is subset of S, and the product of all element is S' is a square number?

A. 3
B. 4
C. 5
D. 6
E. 7

32

```
A B C D
      D
------- x
D C B A
```

Each letter represents a unique digit from 0 to 9. What is the correct value for C?

A. 4
B. 5
C. 7
D. 8
E. 9

33

What is the last two digit of 7^1007?

A. 07
B. 01
C. 49
D. 43
E. 35

34

How many trailing zero are there in 100! (100 x 99 x 98 x ... 1)?

A. 125
B. 24
C. 75
D. 47
E. 11

35

Find P, such that any amount of money greater than P can be formed by using 5-cent and 7-cent denomination!

A. 24
B. 18
C. 23
D. 19

E. 13

36

Supposed that there are four people (A, B, C and D) who play different kind of music instruments.

If C is a pianist, then D would be a violinist.
If D is a guitarist, then C would be a violinist.
If A is a violinist, then B would be a guitarist.
If B is a violinist, then A would not be a drummer.
If A is a pianist, then B would not be a drummer.
If A is a guitarist, then B would no be a drummer.
If C is a drummer, then D would be a pianist
If D is a pianist, then A would not be a violinist.

The best combination for A, B, C and D consecutively is:
A. violin, guitar, drum, piano
B. guitar, violin, drum, piano
C. drum, guitar, piano, violin
D. piano, drum, violin, guitar
E. violin, drum, guitar, piano

37

Let S = { A, B, C, D, E, F } be a set of unique integers.

A is larger than F
C is smaller than A
D is larger than E
B is smaller than F
E is larger than A
F is smaller than C

What is the third largest element in S?

A. A
B. B
C. C
D. D
E. E

38

A web development team consists of 5 members that will be selected from 4 candidate programmers (A, B, C, D) and 4 candidate graphic designers (P, Q, R, S).

A refuses to work with D
B refuses to work with P
Q refuses to work with R
D refuses to work with Q
S refuses to work with A

If B has been chosen, who will be the team graphic designers?

A. S
B. Q
C. Q and S
D. R and S

E. There's no team of 5 member can be formed

39

Let S = { 9, 6, 13, 8, 10, 15, 12, 21 }

What is the length of the longest increasing subsequence of S?

A. 4
B. 5
C. 6
D. 7
E. 8

40

A is taller than B
D is taller than C
C is about the same height with A
E is taller than C

These are correct statements, except:

A. D is taller than B
B. E is taller than B
C. B is the shortest
D. E is the tallest
E. B is shorter than C

41

If we multiply all Prime Numbers below 1000, how many trailing zero are there?

A. 13
B. 1
C. 5
D. 17
E. 2

42

What is the condition for the following equation so that it is always TRUE?

$2^n > n^2$

A. No condition. The expression is always TRUE.
B. n < 3
C. n != 3
D. n > 3
E. n > 4

43

You are given a bag full of coins of three different denominations { 5 cent, 6 cent, 7 cent }, and of infinite amount for each denomination. What is the minimum number of coins needed to get 29 cent amount?

A. 5
B. 7
C. 6
D. 4
E. There's no way to get 29 cent.

44

You are given a bag full of coins of three different denominations {4 cent, 6 cent, 13 cent}, and of infinite amount for each denomination. What is the minimum number of coins needed to get 28 cent amount?

A. 4
B. 3
C. 6
D. 5
E. There's no way to get 28 cent.

45

If you have 10 people in a room and each person shakes hands with every other person exactly once, how many total handshakes happen?

A. 45
B. 50
C. 55
D. 90
E. 100

46

Andy is not able to answer if the problem is too difficult
If Andy is not able to answer, then he will get zero for the exam
Andy get zero for the exam

What is the correct conclusion?

A. Andy is not able to answer
B. If Andy is not able to answer, then the problem is too difficult
C. If Andy doesn't get zero, then the problem is not too difficult
D. Andy is able to answer
E. The problem is not difficult

47

Among the following conditional statements, which one is a tautology?
(notation: -> IF   ^ AND   v OR   ~ NOT)

A. (p ^ q) -> ~p
B. p -> (p ^ q)
C. ~(p -> q) -> ~q
D. (p v q) -> (p ^ q)
E. p ^ (p -> q)

48

```
input a
input b
input c
x = a + b + c
print x
```

If x = 25, which statement will always give TRUE value?

A. a >= 3 OR b >= 19 OR c >= 5
B. a >= 9 OR b >= 10 OR c >= 9
C. a + b >= 15 OR c >= 13
D. a + b >= 15 AND b + c >= 12
E. a >= 13 OR b >= 14

49

Let S be { 1, 2, 3, 4, 5, 6, 7, 8 }, and T be any subset of S with 5 elements.

What is the correct statement?

A. The sum of all elements in T will be larger than 15.
B. At least one pair of element in T has the sum equal to 9.
C. At least two pairs of elements in T has the sum equal to 7.
D. The sum of the three smallest elements int T will be larger than 10.
E. At least one pair of element in T has the difference equal to 5.

50

Every BINUSIAN has an internet account.
Eko does not have an internet account.
Albert has an internet account.

What is the correct conclusion?
A. Albert is not a BINUSIAN
B. Albert is a BINUSIAN
C. Eko is not a BINUSIAN
D. Eko is a BINUSIAN
A. No correct conclusion

Problem A
Math for a Birthday Present

Program File	**math.cpp	math.pas	math.java**
Input File	**math.in**
Output File	**math.out**
Time Limit	**1 second**

Make sure your program read input from file **math.in**, and write output to file **math.out**!

John have just given his daughter, Jane, her 2nd birthday present, a box full of rubber balls with fancy cartoon character drawn on each ball. Each ball has a unique number from 0 to 9 labeled on it. Obviously, John gave these balls not just for another fancy birthday present, but he wanted his daughter to learn about numbers.

First, John took N balls from the box and gave them to his daughter to hold. And then, he would ask them back by using one of these two queries:
1. "Give me the ball with the lowest number from what you have now" (let's call it the lowest query)
2. "Give me the ball with the highest number from what you have now" (let's call it the highest query)
For each ball he received from his daughter, he would put it back into the box, and then he continued his queries until there was no more ball left on Jane.

Surprisingly, Jane understood and chose the correct ball every time. Now, being happy with the potential of his daughter, John wants to teach his daughter to recognize pattern. First, John starts with the lowest query, and then he moves on with the highest query, and then the lowest query again, and so on, alternatively using the queries until all balls have been put back into the box.

With this query pattern (using lowest and highest alternatively), write a program to simulate what Jane will give to her father. Assume that Jane always gives the correct ball to her father and note that John always starts with the lowest query.

Input Specification
Input consists of several test cases. Each test case begins with an integer N (1 <= N <= 10), the

number of ball that Jane have at the beginning. The next line contains N integers $A_{1..n}$, $(0 <= A_i <= 9)$, denoting the label for each ball.

Input is terminated when N = 0 and should not be processed.

Output Specification
For each case, output the sequence of balls that Jane will give to her father following the query pattern. Each number in the sequence should be separated by a single space.

Sample Input

```
5
2 9 1 3 7
8
2 1 3 5 9 7 0 6
0
```

Sample Output

```
1 9 2 7 3
0 9 1 7 2 6 3 5
```

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Problem B
Square Lookup

Program File	**square.cpp	square.pas	square.java**
Input File	**square.in**
Output File	**square.out**
Time Limit	**1 second**

Make sure your program read input from file **square.in**, and write output to file **square.out**!

Given a set S of *N* points in Cartesian coordinate, find the largest square that can be formed by choosing four distinct points from S.
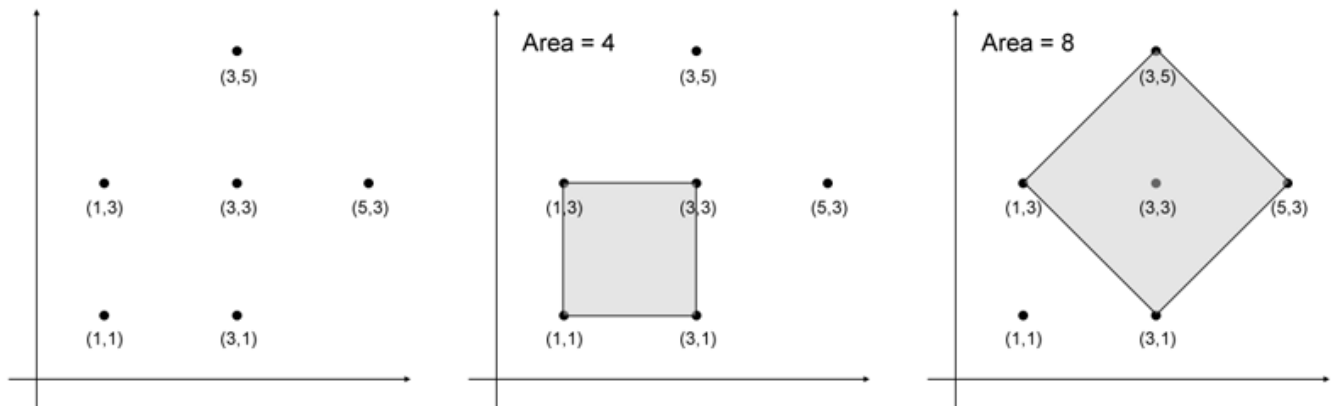
Input Specification

The first line of input contains *T*, the number of test cases.

Each case begins with an integer *N* (1 <= *N* <= 40). The next *N* following lines each consists of a pair of integers, the *x* and *y* coordinate of ith point of S in Cartesian coordinate respectively (-1000 <= *x*, *y* <= 1000).

Output Specification

For each case, output area of the largest square that can be formed by choosing four distinct points from S, rounded to two decimal points. Output "0.00" (without quote) if there are no squares can be formed.

Sample Input

```
2
3
1 1
5 5
1 5
6
1 1
3 1
3 3
1 3
5 3
```

```
3 5
```

Sample Output

```
0.00
8.00
```

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Program File	**fame.cpp	fame.pas	fame.java**
Input File	**fame.in**
Output File	**fame.out**
Time Limit	**1 second**
Make sure your program read input from file **fame.in**, and write output to file **fame.out**!	

Problem C
Hall of Fame

Every end of the month, BINUS holds an online contest on their website to prepare its students to be ready for ICPC (International Collegiate Programming Contest). The contest is similar to BNPC-HS, except that there is only one winner for every contest.

To motivate the students, one of the coaches creates a leader board to show who won the most so far. The board will be updated at the end of each contest. Student with most wins will hold the top-ranked position. In a tie situation, the student with most wins before the last contest conducts should hold the top-ranked position. Students who hold the top-ranked position in the leader board for P consecutive month(s) will be listed in the Hall of Fame. Each student should be listed in the Hall of Fame at most once.

Suppose that we know the result of every contest, write a program to find out how many students are there that would be listed in the Hall of Fame.

Input Specification

The first line of the input is an integer T, denoting the number of test cases will follow.

Each test case begins with two integers, N ($1 <= N <= 100$) the number of contests that have been held from the beginning, and P ($1 <= P <= 10$) the number of consecutive month(s) for a student should hold top-ranked position to be listed in the Hall of Fame. The next N line, each contains a student name who won the i-th contest. Student's name will be at most 10 characters of lowercase alphabet(s).

Output Specification

For each case, output in a single line the number of students who have been listed in the Hall of Fame.

Sample Input

```
2
4 3
robert
robert
denny
robert
6 1
rudi
albert
joni
albert
joni
rudi
```

Sample Output

```
1
2
```

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