Московский авиационный институт (национальный исследовательский университет)

Институт информационных технологий и прикладной математики

Кафедра вычислительной математики и программирования

Журнал по исследовательской практике (индивидуальный план)

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Сводная таблица за осень 2021

Дата	Название	Время	Место проведения	Решенные задачи
12.09.2021	Grand Prix of Dolgoprudny	11:00	Дистанционно	L, O
19.09.2021	Grand Prix of IMO	11:00	Дистанционно	N, P
26.09.2021	Grand Prix of XiAn	11:00	Дистанционно	L, N
10.10.2021	XXII Открытая Всесибирская олимпиада	12:00	Дистанционно	N, O, L
24.10.2021	Grand Prix of Korea	11:00	Дистанционно	A, K
07.11.2021	Grand Prix of Siberia	11:00	Дистанционно	3, 14
14.11.2021	Grand Prix of EDG	11.00	Дистанционно	A, I, M, N
21.11.2021	RuCode 4.0	11:00	Дистанционно	A, C, L
28.11.2021	Stage 7-B: Grand Prix of Southeastern Europe, Div 2	11:00	Дистанционно	O, P
05.12.2021	Stage 8-B: Grand Prix of Poland, Div 2	11:00	Дистанционно	H, N, R
12.12.2021	Stage 9-B: Grand Prix of Nanjing, Div 2	11:00	Дистанционно	A, N, O, P, Q
19.12.2021	Moscow Regional Contest 2021	11:00	Дистанционно	A, F, N

Явка на контесты

Дата	Название	Присутствующие
12.09.2021	Grand Prix of Dolgoprudny	Кузьмичев, Орозбакиев, Синявский
19.09.2021	Grand Prix of IMO	Кузьмичев, Орозбакиев, Синявский
26.09.2021	Grand Prix of XiAn	Кузьмичев, Орозбакиев, Синявский
10.10.2021	XXII Открытая Всесибирская олимпиада	Кузьмичев, Орозбакиев, Синявский
24.10.2021	Grand Prix of Korea	Кузьмичев, Орозбакиев, Синявский
07.11.2021	Grand Prix of Siberia	Кузьмичев, Орозбакиев, Синявский
14.11.2021	Grand Prix of EDG	Кузьмичев, Орозбакиев, Синявский
21.11.2021	RuCode 4.0	Кузьмичев, Орозбакиев, Синявский
28.11.2021	Stage 7-B: Grand Prix of Southeastern Europe, Div 2	Кузьмичев, Орозбакиев, Синявский
05.12.2021	Stage 8-B: Grand Prix of Poland, Div 2	Кузьмичев, Орозбакиев, Синявский
12.12.2021	Stage 9-B: Grand Prix of Nanjing, Div 2	Кузьмичев, Орозбакиев, Синявский
19.12.2021	Moscow Regional Contest 2021	Кузьмичев, Орозбакиев, Синявский

Решения задач

Grand Prix of Dolgoprudny 12.09.2021

17.	MAI #9 Efimov, Kholodyakov, Sakharin:	-	-4 4:57	-	-	-	-	-
18.	MAI #20 Kuzmichev, Orozbakiev, Sinyavsky	-	-	-	-	-	-	-
19.	MAI #44 Artamonov, Polyakov, Sinitsyn :	-	-	-	-	-	-	-

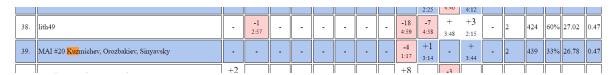
Решение 1

```
1 | N, M = (int(i) for i in input().split())
2 | if M >= N:
3 | print(0)
4 | else:
5 | print(N - M)
```

Решение 2

```
1  | m, i = (int(i) for i in input().split())
2  | p, t = (int(i) for i in input().split())
3  | w = int(input())
4  |
5  | path_len = abs(m-p) + abs(i-t)
6  |
7  | if path_len > w or (path_len%2 != w%2):
8  | print('N')
9  | else:
10  | print('Y')
```

Grand Prix of IMO 19.09.2021



Решение N

```
1 | S = input()
2 | T = input()
3 | length = len(S)
4 |
5 | success = False
6 | flags = [1, 0]
7 | for st_flag in flags:
8 | flag = st_flag
```

```
9 \parallel
     i = 0
10
     j = 0
11
     match_it = 0
12
     while i <= length-1 and j <= length-1:
13
       if flag:
14
         if S[i] == S[match_it]:
15
           match_it += 1
           flag = 0
16
17
         i += 1
18
       else:
19
         if T[j] == S[match_it]:
20
           match_it += 1
21
           flag = 1
22
         j += 1
23
       if match_it == length:
24
         success = True
25
         break
26
     if success == True:
27
       break
28 print("Yes" if success else "No")
```

Решение Р

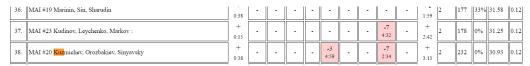
```
1 \parallel N = int(input())
 2 \parallel s = input()
 3 \parallel \text{res} = 0
 4 \parallel \text{for i in range(N)}:
 5
     print(i)
 6
      s_{cpy} = list(s)
 7
      count = 0
 8
      memory = ''
 9
       j = i
10
      while True:
11
         if (j == 0 \text{ or } j == N-1) and s_{cpy}[j] == '_{:}:
12
           res = max(res, count)
13
           break
14
         if (j == 0 \text{ and } s_{cpy} == '<') or (j == N-1 \text{ and } s_{cpy} == '>'):
15
           count += 1
16
           res = max(res, count)
17
           break
18
         if s_{cpy}[j] == '>':
19
           s_cpy[j] = '_'
20
           count += 1
21
           j += 1
22
           memory = '>'
23
         elif s_{cpy}[j] == '<':
24
           s_cpy[j] = '_'
25
           count += 1
26
           j -= 1
27
           memory = '<'
```

```
28 | elif s_cpy[j] == '_':
29 | j = j+1 if memory == '>' else j-1
30 | print(res)
```

Grand Prix of XiAn 26.09.2021

47.	MAI #33 Amursky, Lyugge, Chesnov :	-	-	-	-	-	-	0:40	-	3:11	-8 2:55	-2 1:27	2	231	0%	26.82	0.16
48.	MAI #20 Kuzmichev, Orozbakiev, Sinyavsky	-	-	-	-	-	-	+1 1:22	-	+1 2:07	-1 4:55	-	2	250	50%	26.59	0.16
49.	MAI #25 Vasiliev, Ilyin, Marochkin	-	-	-	-	-	-	+ 1:29	-	+ 2:41	-	-	2	250	0%	26.37	0.16

Grand Prix of Korea 24.10.2021



Решение А

```
1  | m = int(input())
2  | a = [int(i) for i in input().split()]
3  | i = 0
4  | while i <= m-1:
5  | print(a[i], end='')
6  | i += a[i]
7  | if i <= m-1:
8  | print('', end='')</pre>
```

Grand Prix of Siberia 07.11.2021

42.	MAI #29 Leukhin, Sikorsky, Yadrov :	-	-	+ 0:44	-	-	-	-	-	-	-2 1:01	+ 0:18	2	63	0%	39.06	0.06	
43.	MAI #20 Kuzmichev, Orozbakiev, Sinyavsky	-	-	+ 1:09	-	-	-	-	-	-	-5 4:57	+ 1:00	2	129	0%	38.67	0.06	
44.	MAI #19 Marinin, Sin, Sharudin	-	-	+ 0:34	-	-	-	-	-	-	-2 2:25	+2 1:09	2	143	50%	38.28	0.06	

Решение 3

```
1 | B = int(input())
2 | for i in range(B):
3 | S,n,f,m = (int(i) for i in input().split())
4 | if (S >= n + m) and (S <= n*f + m):
5 | print('YES')
6 | else:
7 | print('NO')</pre>
```

Решение 14

```
1 \parallel N, S = (int(i) for i in input().split())
   pairs = []
 3 \parallel \text{used} = \text{set}()
 4 \parallel \text{max}_a = 0
 5 | for i in range(N):
 6
    a, b = (int(i) for i in input().split())
 7
     pairs.append((a, b))
 8
   pairs.sort(key=lambda x: x[1])
 9
10 | for pair in pairs:
11
    if pair[1] > S:
12
        break
13
      elif pair[0] in used:
14
        continue
15
      else:
16
        S -= pair[1]
17
        used.add(pair[0])
18 | print(len(used))
```

Grand Prix of EDG 14.11.2021



Решение В

```
1 | T = int(input())
2 | for i in range(T):
3 | x = int(input())
4 | print(2*x-1)
```

Решение D

```
1 \parallel T = int(input())
2
3 | for case in range(T):
     n = int(input())
4
5
     soldiers = input()
6
     count = 0
7
     sum = 0
     for i in range(n-1, -1, -1):
8
9
       if soldiers[i] == '0':
10
         count += 1
11
        else:
12
         if count > 0:
13
           sum += i+1
14
           count -= 1
15
          else:
16
           count += 1
17
      print(sum)
```

Решение F

```
1 \parallel N = int(input())
2 \parallel D = [int(i) \text{ for i in input().split()}]
3 D.sort(reverse=True)
4 | #print(D)
5 | if N == 1:
6 | print(1)
7 else:
8
     res = 1
    tmp = 1
9
10
     for i in range(1,N):
11
        if D[i-1] == D[i]:
12
          tmp += 1
13
        else:
14
          res = max(res, tmp)
15
          tmp = 1
16
    print(res)
```

Решение L

```
1 \parallel \text{def gcd (a, b)}:
 2
      if (b==0):
 3
        return a
 4
      else:
 5
        return gcd(b, a%b)
 6
 7 \parallel n = int(input())
 8 || nums = []
 9
    b = []
10 \parallel \text{for i in range(n)}:
11
      a, b_ = (int(i) for i in input().split())
      nums.append(a)
12
13
      b.append(b_)
14
15 \parallel \gcd_nums = nums[0]
16 \mid | \text{if n} > 0:
17
     for i in range(1, n):
18
         gcd_nums = gcd(gcd_nums, nums[i])
19
20 \parallel gcd_b = b[0]
21 \mid | \text{if n} > 0:
     for i in range(1, n):
22
23
         gcd_b = gcd(gcd_b, b[i])
24
25 | prod = 1
26 | for num in nums:
27
      prod = prod * num
28
29 | print(int(prod / gcd_nums), gcd_b)
```

RuCode 4.0 21.11.2021

Решение А

```
1 | a = int(input())
2 | b = int(input())
3 | c = int(input())
4 | print(a + b + c)
```

Решение С

```
1 | n = int(input())
2 | k = int(input())
3 | donuts = [False for i in range(n)]
4 | count = 0
5 | for i in range(k):
6 | dnt = int(input()) - 1
7 | if not donuts[dnt]:
8 | count += 1
9 | donuts[dnt] = True
10 | print(count)
11 | print(count + (n-k))
```

Решение L

```
1 | import sys
 2
 3 \parallel x = 0
 4 || y = "
 5 | seen_edge = False
 6 | revealed_figure = ''
 7 \mid \text{count} = 0
   moved_left = False
 8 |
   moved_down = False
 9
10
11 while True:
12
     if count == 8:
13
       x += 1
14
       break
15
      info = input()
16
      if info == 'black' or info == 'white' or info == 'pawn':
17
        x += 1
18
        count += 1
19
       moved_down = False
20
       print("? D")
21
        sys.stdout.flush()
22
23
        if revealed_figure == info and moved_down:
24
25
       elif revealed_figure == '':
26
         revealed_figure = info
```

```
27
         count += 1
28
         x += 1
29
         print("? L")
30
         sys.stdout.flush()
31
         moved_left = True
32
       elif moved_left:
33
         moved_left = False
34
         if info == revealed_figure:
35
           y = a
36
         elif revealed_figure == 'king':
37
           y = 'd'
38
         elif revealed_figure == 'queen':
39
           y = e
40
         elif info == 'rook':
41
          y = b
42
         elif info == 'knight':
43
           y = 'h' if revealed_figure == 'rook' else 'c'
44
         elif info == 'bishop':
45
           y = g'
46
         elif info == 'queen':
47
           y = 'f'
48
         revealed_figure = info
49
         count += 1
         print("? D")
50
51
         sys.stdout.flush()
52
         moved_down = True
53 | print(f'! {y}{x-1}')
```

Stage 7-B: Grand Prix of Southeastern Europe 28.11.2021

25.	MAI #14 Mazin, Mikhailova, Naumov :	-	-	-	-	-3 4:38	-	-	-	-	-	-	-	2:14	0:45	2	220	50%	55.06	0.11
26.	MAI #20 Kuzmichev, Orozbakiev, Sinyavsky	-	-	-	-	-	-	-	-	-	-	-	-	+ 1:15	+ 2:28	2	223	0%	54.36	0.11
27.	MAI #32 Pishhik, Uvarov, Kharkov	-3 4:39	-	-	-	-3 3:33	-	-	-	-	-	-	-	+ 0:41	+2 2:32	2	233	50%	53.67	0.11

Решение О

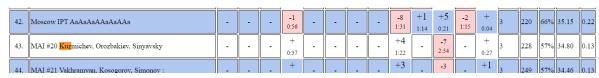
```
1 \mid\mid n = int(input())
 2 \parallel s = input()
 3 \parallel t = input()
 4
 5 \parallel \text{res} = 0
 6 \mid | count = 1
 7
   for i in range(n):
 8
     if s[i] == t[i]:
 9
       count += 1
10
       else:
11
         if s[i] < t[i]:
12
           res += count * (n-i)
```

```
13 | count = 1
14 | print(res)
```

Решение Р

```
1 \parallel N = int(input())
   a = [int(i) for i in input().split()]
 3 \parallel b = [int(i) \text{ for i in input().split()}]
 4 \parallel \text{res} = 0
 5 | for i in range(N-1, -1, -1):
 6
     if b[i+1] > a[i+1]:
 7
        tmp = (b[i+1] - a[i+1] + 1) // 2
 8
        b[i] += tmp
 9
        res += tmp
10 \parallel \text{if b}[0] > a[0]:
11 | print(-1)
12 | else:
13 print(res)
```

Stage 8-B: Grand Prix of Poland, Div 2 05.12.2021



Решение Н

```
1 | T = int(input())
2 | for i in range(T):
3 | s = input()
4 | for c in s:
5 | print(chr((ord(c)+13-97)%26+97), end='')
6 | print()
```

Решение N

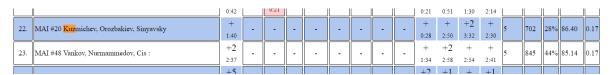
```
1 \parallel T = int(input())
2
   for case in range(T):
3
    N = int(input())
4
     L = 1
5
     a = 0.3
     while L*(L+1) < 2*N:
6
7
       a = (float(N) - L*(L+1)/2)/(L+1)
8
       if int(a) == a:
9
         break
10
       L += 1
11
     if int(a) != a:
12
       print('IMPOSSIBLE')
13
     else:
```

```
14 | print(f'{N} = {int(a)}', end='')
15 | for i in range(1, L+1):
16 | print(f' + {int(a + i)}', end='')
17 | print()
```

Решение R

```
1 \parallel T = int(input())
   for case in range(T):
3
     full = True
4
     nums = [0 for i in range(10)]
5
     s = input()
6
     for i in range(len(s)):
7
       nums[int(s[i])] += 1
8
     for i, num in enumerate(nums):
9
        if not num:
10
         print(i, end='')
11
         full = False
12
      if full:
13
       print('full', end='')
14
     print()
```

Stage 9-B: Grand Prix of Nanjing, Div 2 12.12.2021



Решение А

```
1 || n, a, b = (int(i) for i in input().split())
2 || print("D"*(n-1) if n/2 > b else "U"*(n-1), end='')
```

Решение О

```
1 | N = int(input())

2 | print((N // 26) + (N % 26 > 0) + 1, end = '')

4 | print(chr((N-1) % 26 + ord('a')))
```

Решение Q

```
1 | n = int(input())
2 | d = []
3 | for i in range(n):
4 | d.append(int(input()))
5 |
6 | hm = {}
7 | res = 0
8 | s = 0
```

```
9 \parallel
10 \parallel \text{for i in range(n)}:
11
      s += d[i]
12
      if d[i] == 0 and res == 0:
13
        res = 1
14
      if s == 0:
15
       res = i + 1
16
      if s in hm:
17
        res = max(res, i - hm[s])
18
      else:
19
        hm[s] = i
20 print(res)
```

Moscow Regional Contest 2021 19.12.2021

#	Participant O Y	A 278/352	B 0/8	C 11/27	D 134/681	E 87/849	F 239/511	G 175/322	H 154/972	l 12/623	J 51/109	K 3/8	L 37/104	M 71/345	N 235/649	O 2/29	Score
203	Moscow Al: MAI #20 (Andrey Sinyavsky,Aleksander Kuzmichev,Emil Orozbakiev)	+ 00:14	_	_	_	-	+1 00:30	_	_	-	_	_	_	_	+2 02:16	_	3

Решение F

```
1 \parallel n = int(input())
2
   if n < 4:
    print(-1)
3
4
  else:
     print(5 + (n-4))
5
6
     print("1 2\n1 3\n2 3\n2 4\n3 4")
7
     if n > 4:
8
       tmp = 4
9
       for i in range(n-4):
         print(f'{tmp} {tmp+1}')
10
11
         tmp += 1
```

Решение N

 $15 \parallel$ else: $16 \parallel$ print(1)