

## КОНТРОЛЬНАЯ ТОЧКА С2 (А, 1сем, 2017)

### Задачи 1,2,3 (каждая по 1 баллу)

Даны вершины треугольника  $ABC$ . Найдите:

1. уравнение высоты  $AH$ ;
2. уравнение медианы  $AM$ ;
3. косинус угла при вершине  $A$ .

1.  $A(1, -2), B(0, -1), C(3, 4)$ .
2.  $A(0, -3), B(-12, -3), C(-9, -6)$ .
3.  $A(3, 3), B(5, -2), C(4, 1)$ .
4.  $A(-1, 2), B(3, 4), C(1, 1)$ .
5.  $A(-4, -2), B(-1, 2), C(3, 6)$ .
6.  $A(5, 3), B(6, -2), C(-4, 6)$ .
7.  $A(-3, 7), B(0, -1), C(2, 3)$ .
8.  $A(2, -4), B(0, -2), C(6, 8)$ .
9.  $A(0, 1), B(3, 2), C(-8, 4)$ .
10.  $A(3, 3), B(1, 5), C(-4, 4)$ .
11.  $A(2, 1), B(6, -1), C(4, 2)$ .
12.  $A(-1, -2), B(-4, -3), C(-8, 2)$ .
13.  $A(6, 2), B(8, 7), C(-4, 6)$ .
14.  $A(0, 4), B(-3, -6), C(-5, 0)$ .
15.  $A(2, -8), B(4, -6), C(-2, 0)$ .
16.  $A(3, -6), B(0, -3), C(9, 12)$ .
17.  $A(0, 2), B(8, 6), C(-4, 8)$ .
18.  $A(3, 3), B(5, 1), C(-8, 4)$ .
19.  $A(-4, 3), B(0, 1), C(-2, -4)$ .
20.  $A(1, -1), B(-2, 1), C(8, 2)$ .
21.  $A(7, 0), B(-8, 1), C(3, 4)$ .
22.  $A(2, 3), B(-1, -3), C(6, 8)$ .
23.  $A(2, 2), B(0, 8), C(-2, 4)$ .
24.  $A(-1, 2), B(0, 1), C(-3, -4)$ .
25.  $A(0, 3), B(9, 4), C(-2, 7)$ .
26.  $A(-1, 4), B(3, 0), C(-2, -5)$ .
27.  $A(2, 4), B(-4, 1), C(0, -5)$ .
28.  $A(2, -4), B(3, 5), C(-4, 0)$ .
29.  $A(-1, 4), B(5, 6), C(0, 1)$ .
30.  $A(-4, 3), B(4, 6), C(0, -3)$ .

### Задача 4 (3 балла)

Даны уравнения двух прямых. Найдите косинус угла между ними.

1.  $x - 3y + 5 = 0, 2x - y - 16 = 0$ .
2.  $x - 3y - 1 = 0, x + y - 1 = 0$ .
3.  $4x - 5y - 1 = 0, x - 4y + 9 = 0$ .
4.  $3x - y + 15 = 0, 5x + 9y - 1 = 0$ .
5.  $6x + 2y + 17 = 0, 9x + 3y - 4 = 0$ .
6.  $x - 2y - 1 = 0, x + y + 3 = 0$ .
7.  $3x - y = 0, 2x + y - 8 = 0$ .
8.  $6x + 3y - 2 = 0, x + 2y + 6 = 0$ .
9.  $x + 2y + 3 = 0, 6x + 2y - 1 = 0$ .
10.  $2x - y + 16 = 0, x + 2y + 8 = 0$ .
11.  $2x + y - 1 = 0, x + y - 1 = 0$ .
12.  $3x + y - 4 = 0, x + 2y + 5 = 0$ .
13.  $3x - 2y - 16 = 0, x + y - 7 = 0$ .
14.  $2x + y + 9 = 0, x - y - 1 = 0$ .
15.  $x + 2y - 3 = 0, 2x - y + 5 = 0$ .
16.  $3x + 2y - 1 = 0, x + y - 7 = 0$ .
17.  $x - 3y - 8 = 0, x + y + 3 = 0$ .
18.  $3x - 2y + 23 = 0, x + y + 5 = 0$ .

19.  $x+y+7=0$ ,  $x+2y-1=0$ .

20.  $x-2y+17=0$ ,  $x-2y-1=0$ .

21.  $x+2y-1=0$ ,  $x+y+6=0$ .

22.  $2x-y+5=0$ ,  $2x+3y-7=0$ .

23.  $5x+3y-18=0$ ,  $2x+y-9=0$ .

24.  $4x+3y-2=0$ ,  $x+2y+5=0$ .

25.  $x+4y+1=0$ ,  $2x+y-3=0$ .

26.  $x+3y-1=0$ ,  $4x+2y+5=0$ .

27.  $2x-3y+7=0$ ,  $x-8y+1=0$ .

28.  $4x-y-4=0$ ,  $2x-2y+1=0$ .

29.  $3x-y+3=0$ ,  $4x-5y+3=0$ .

30.  $2x-4y+7=0$ ,  $3x-5y+4=0$ .

**Задача 5 (4 балла)**  
Решить ЗЛП графически

Вариант	Задача	Вариант	Задача
1	$Z(X) = 2x_1 + 3x_2 \rightarrow \max,$ $\begin{cases} -2x_1 + x_2 \leq 2, \\ x_1 - 3x_2 \geq -9, \\ 4x_1 + 3x_2 \leq 24, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	16	$Z(X) = 5x_1 + 5x_2 \rightarrow \max,$ $\begin{cases} -2x_1 + x_2 \leq 2, \\ -x_1 + 3x_2 \geq 9, \\ x_1 + x_2 \geq 3, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
2	$Z(X) = 5x_1 - 3x_2 \rightarrow \min,$ $\begin{cases} 4x_1 - x_2 \geq 0, \\ -x_1 + x_2 \leq 3, \\ 2x_1 - 3x_2 \leq 6, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	17	$Z(X) = -x_1 - x_2 \rightarrow \max,$ $\begin{cases} -3x_1 + 2x_2 \leq 4, \\ -x_1 + 2x_2 \leq 8, \\ x_1 + x_2 \geq 10, \\ 4x_1 - x_2 \leq 20, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
3	$Z(X) = 2x_1 + 3x_2 \rightarrow \max,$ $\begin{cases} -6x_1 + x_2 \leq 3, \\ -5x_1 + 9x_2 \leq 45, \\ x_1 - 3x_2 \leq 3, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	18	$Z(X) = 5x_1 - x_2 \rightarrow \min,$ $\begin{cases} 2x_1 - 3x_2 \leq 0, \\ -5x_1 + 9x_2 \leq 45, \\ x_1 - 2x_2 \leq 4, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
4	$Z(X) = 2x_1 + 2x_2 \rightarrow \max,$ $\begin{cases} -3x_1 + 2x_2 \leq 4, \\ -x_1 + 2x_2 \leq 8, \\ x_1 + x_2 \leq 10, \\ 4x_1 - x_2 \leq 20, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	19	$Z(X) = 4x_1 + 2x_2 \rightarrow \min,$ $\begin{cases} -3x_1 + 2x_2 \leq 6, \\ x_1 + 2x_2 \geq 10, \\ x_1 - 3x_2 \leq 6, \\ x_1 + x_2 \geq 3, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
5	$Z(X) = 2x_1 + 4x_2 \rightarrow \max,$ $\begin{cases} -3x_1 + 2x_2 \leq 6, \\ x_1 + 2x_2 \geq 10, \\ x_1 - 5x_2 \leq 5, \\ x_1 + x_2 \leq 4, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	20	$Z(X) = -3x_1 - x_2 \rightarrow \min,$ $\begin{cases} 4x_1 - x_2 \geq 0, \\ 2x_1 - x_2 \leq 0, \\ x_1 + x_2 \leq 3, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
6	$Z(X) = 15x_1 + 10x_2 \rightarrow \max,$ $\begin{cases} 6x_1 - x_2 \geq 3, \\ -x_1 + 2x_2 \leq 8, \\ 3x_1 + 2x_2 \leq 24, \\ x_1 - x_2 \leq 3, \\ x_1 + 2x_2 \geq 2, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	21	$Z(X) = 2x_1 + 3x_2 \rightarrow \max,$ $\begin{cases} -2x_1 + x_2 \leq 2, \\ x_1 - 3x_2 \geq -9, \\ 4x_1 + 3x_2 \leq 24, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
7	$Z(X) = 3x_1 + 2x_2 \rightarrow \max,$ $\begin{cases} 3x_1 - x_2 \geq 0, \\ x_1 - x_2 \geq -2, \\ 4x_1 - x_2 \leq 16, \\ 2x_1 - x_2 \leq 6, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	22	$Z(X) = 5x_1 - 3x_2 \rightarrow \min,$ $\begin{cases} 4x_1 - x_2 \geq 0, \\ -x_1 + x_2 \leq 3, \\ 2x_1 - 3x_2 \leq 6, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$

8	$Z(X) = 2x_1 + 5x_2 \rightarrow \min,$ $\begin{cases} 2x_1 + x_2 \geq 4, \\ -x_1 + x_2 \leq 4, \\ x_1 + 2x_2 \leq 14, \\ -x_1 + 3x_2 \geq 5, \\ x_1 < 4, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	23	$Z(X) = 2x_1 + 3x_2 \rightarrow \max,$ $\begin{cases} -6x_1 + x_2 \leq 3, \\ -5x_1 + 9x_2 \leq 45, \\ x_1 - 3x_2 \leq 3, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
9	$Z(X) = 2x_1 - x_2 \rightarrow \max,$ $\begin{cases} -x_1 + x_2 < 2, \\ 2x_1 + 3x_2 \geq 16, \\ x_1 + x_2 < 10, \\ 2x_1 - x_2 \leq 8, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	24	$Z(X) = x_1 + 4x_2 \rightarrow \min,$ $\begin{cases} 2x_1 + 3x_2 \geq 6, \\ -2x_1 + 3x_2 \geq 6, \\ x_1 + x_2 \leq 3, \\ 2x_1 - 3x_2 \leq 0, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
Вариант	Задача	Вариант	Задача
10	$Z(X) = 3x_1 + 2x_2 \rightarrow \max,$ $\begin{cases} 2x_1 - x_2 \geq 0, \\ -x_1 + 2x_2 \leq 3, \\ x_2 \leq 3, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	25	$Z(X) = x_1 - 4x_2 \rightarrow \min,$ $\begin{cases} x_1 - 3x_2 \leq 0, \\ x_1 - x_2 > 0, \\ 2x_1 + x_2 \geq 6, \\ 2x_1 + 3x_2 \leq 18, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
11	$Z(X) = 2x_1 + 4x_2 \rightarrow \min,$ $\begin{cases} 2x_1 + x_2 \geq 9, \\ x_1 + 2x_2 \leq 15, \\ x_1 + 2x_2 \geq 9, \\ 2x_1 + x_2 \leq 15, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	26	$Z(X) = -5x_1 + x_2 \rightarrow \min,$ $\begin{cases} 2x_1 - 3x_2 \geq 0, \\ x_1 + 3x_2 \geq 9, \\ x_1 - 3x_2 \leq 3, \\ -x_1 + 3x_2 \leq 3, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
12	$Z(X) = 2x_1 + 2x_2 \rightarrow \max,$ $\begin{cases} -3x_1 + 2x_2 \leq 4, \\ -x_1 + 2x_2 \leq 8, \\ x_1 + x_2 \leq 10, \\ 4x_1 - x_2 \leq 20, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	27	$Z(X) = 2x_1 + 4x_2 \rightarrow \max,$ $\begin{cases} -3x_1 + 2x_2 \leq 6, \\ x_1 + 2x_2 \geq 10, \\ x_1 - 5x_2 \leq 5, \\ x_1 + x_2 \leq 4, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
13	$Z(X) = 3x_1 - x_2 \rightarrow \max,$ $\begin{cases} -3x_1 + 2x_2 \leq 6, \\ 2x_1 - 3x_2 \leq 6, \\ x_1 \leq 6, \\ x_2 \leq 6, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	28	$Z(X) = 15x_1 + 10x_2 \rightarrow \max,$ $\begin{cases} 6x_1 - x_2 \geq 3, \\ -x_1 + 2x_2 \leq 8, \\ 3x_1 + 2x_2 \leq 24, \\ x_1 - x_2 \leq 3, \\ x_1 + 2x_2 \geq 2, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$

14	$Z(X) = x_1 - 2x_2 \rightarrow \min,$ $\begin{cases} 2x_1 - x_2 \geq -2, \\ -x_1 + 2x_2 \leq 7, \\ -4x_1 + 3x_2 \geq -12, \\ x_1 + 3x_2 \geq 18, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	29	$Z(X) = 3x_1 + 2x_2 \rightarrow \max,$ $\begin{cases} 3x_1 - x_2 \geq 0, \\ x_1 - x_2 \geq -2, \\ 4x_1 - x_2 \leq 16, \\ 2x_1 - x_2 \leq 6, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$
15	$Z(X) = 3x_1 + 6x_2 \rightarrow \max,$ $\begin{cases} -4x_1 + x_2 \geq 0, \\ x_1 - x_2 \geq -3, \\ 2x_1 - 3x_2 \leq 6, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$	30	$Z(X) = 3x_1 + 4x_2 \rightarrow \max,$ $\begin{cases} 4x_1 - x_2 \geq 0, \\ -x_1 + x_2 \leq 3, \\ 3x_1 + 2x_2 \geq 6, \\ 2x_1 - 5x_2 \geq 0, \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$