



## 5075 - Intersection of Two Prisms

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Suppose that  $P_1$  is an infinite-height prism whose axis is parallel to the  $z$ -axis, and  $P_2$  is also an infinite-height prism whose axis is parallel to the  $y$ -axis.  $P_1$  is defined by the polygon  $C_1$  which is the cross section of  $P_1$  and the  $xy$ -plane, and  $P_2$  is also defined by the polygon  $C_2$  which is the cross section of  $P_2$  and the  $xz$ -plane.

Figure I.1 shows two cross sections which appear as the first dataset in the sample input, and Figure I.2 shows the relationship between the prisms and their cross sections.

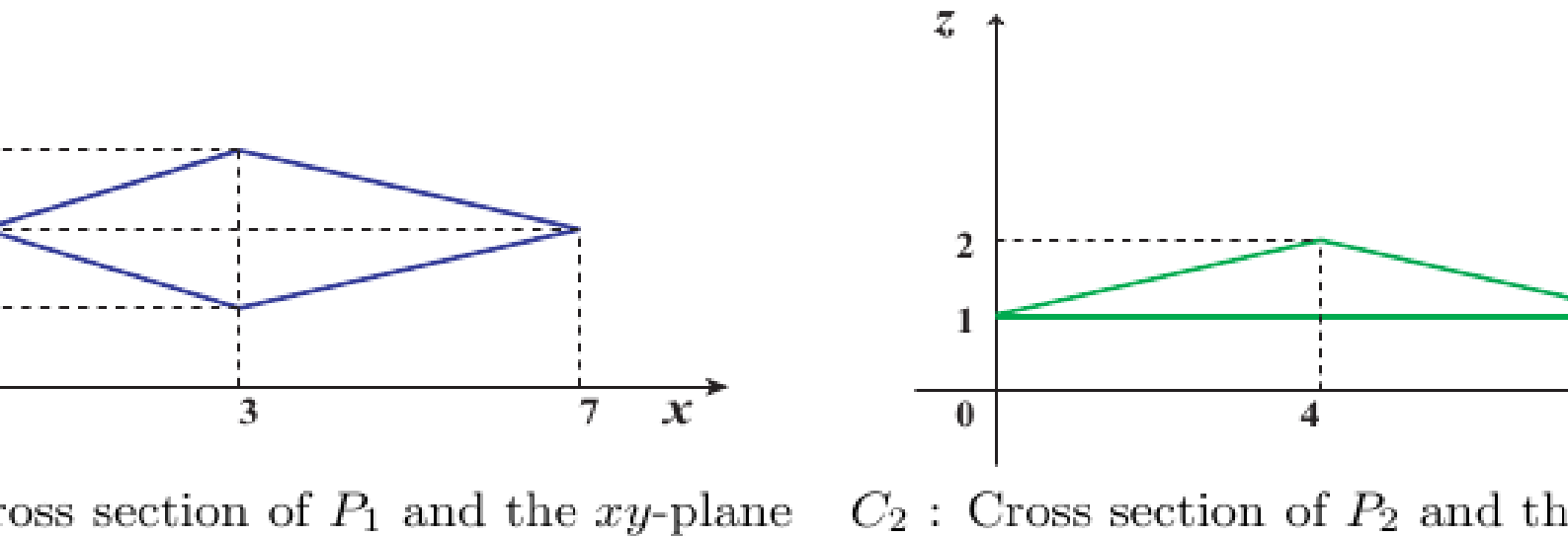


Figure I.1: Cross sections of Prisms

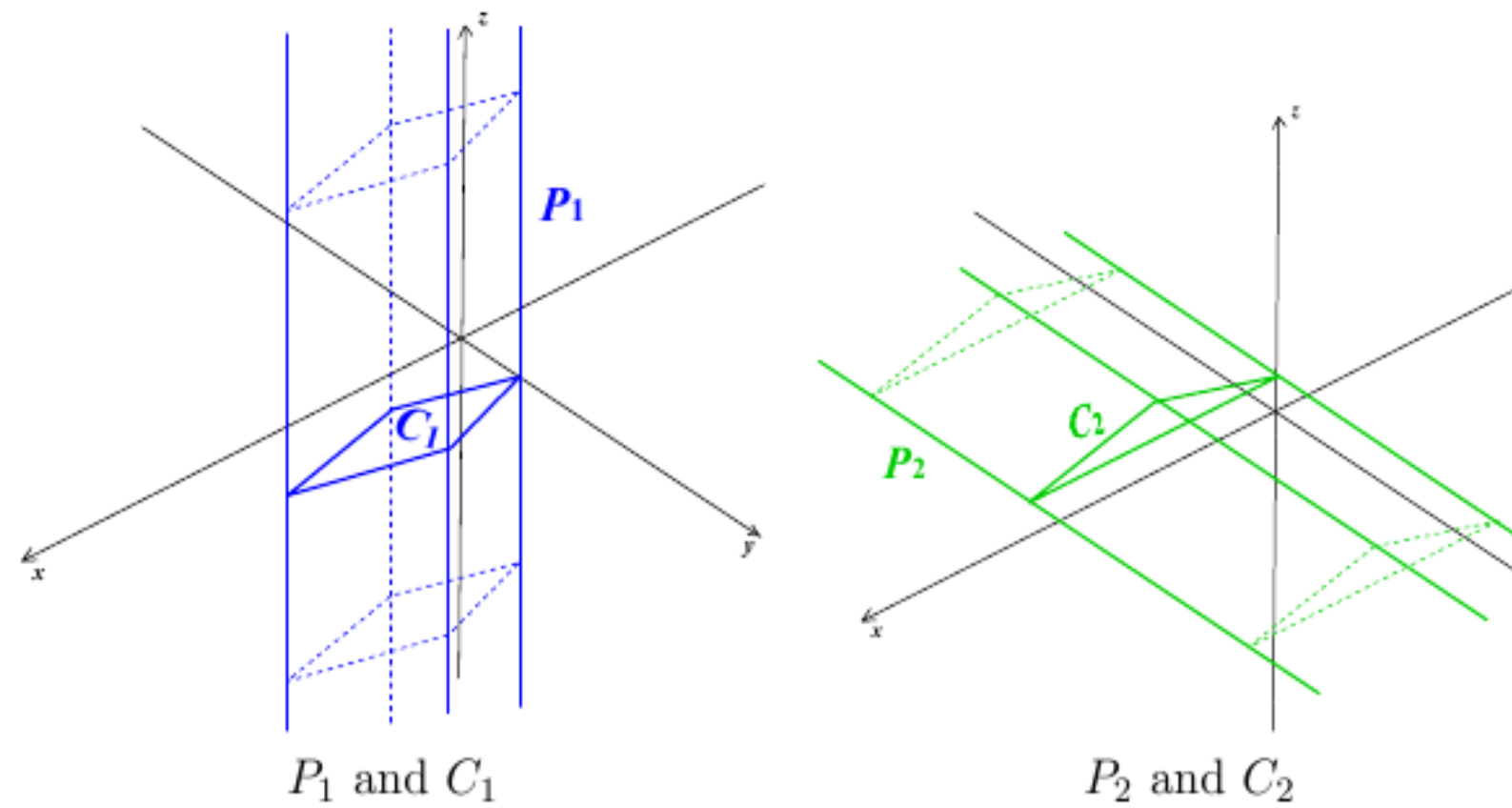


Figure I.2: Prisms and their cross sections

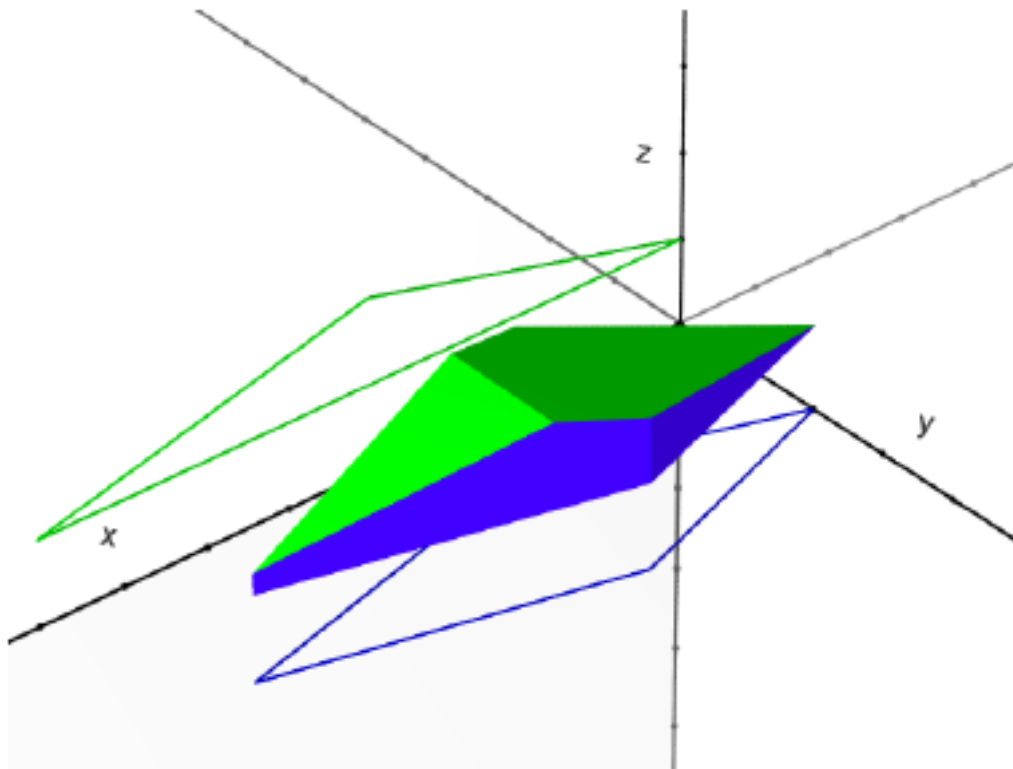


Figure I.3: Intersection of two prisms

Figure I.3 shows the intersection of two prisms in Figure I.2, namely,  $P_1$  and  $P_2$ .

Write a program which calculates the volume of the intersection of two prisms.

## Input

The input is a sequence of datasets. The number of datasets is less than 200.

Each dataset is formatted as follows.

```
m n
x11 y11
x12 y12
⋮
x1m y1m
x21 z21
x22 z22
⋮
x2n z2n
```

$m$  and  $n$  are integers ( $3 \leq m \leq 100$ ,  $3 \leq n \leq 100$ ) which represent the numbers of the vertices of the polygons,  $C_1$  and  $C_2$ , respectively.

$x_{1i}$ ,  $y_{1i}$ ,  $x_{2j}$  and  $z_{2j}$  are integers between -100 and 100, inclusive.  $(x_{1i}, y_{1i})$  and  $(x_{2j}, z_{2j})$  mean the  $i$ -th and  $j$ -th vertices' positions of  $C_1$  and  $C_2$  respectively.

The sequences of these vertex positions are given in the counterclockwise order either on the  $xy$ -plane or the  $xz$ -plane as in Figure I.1.

You may assume that all the polygons are convex, that is, all the interior angles of the polygons are less than 180 degrees. You may also assume that all the polygons are simple, that is, each polygon's boundary does not cross nor touch itself.

The end of the input is indicated by a line containing two zeros.

## Output

For each dataset, output the volume of the intersection of the two prisms,  $P_1$  and  $P_2$ , with a decimal representation in a line.

None of the output values may have an error greater than 0.001. The output should not contain any other extra characters.

## Sample Input

```
4 3
7 2
3 3
0 2
3 1
4 2
0 1
8 1
4 4
30 2
30 12
2 12
2 2
15 2
30 8
13 14
2 8
8 5
13 5
21 7
21 9
18 15
11 15
6 10
6 8
8 5
10 12
5 9
15 6
20 10
18 12
3 3
5 5
10 3
10 10
20 8
10 15
10 8
4 4
-98 99
-99 -99
99 -98
99 97
-99 99
-98 -98
99 -99
96 99
0 0
```

## Sample Output

```
4.708333333333333
1680.0000000000005
491.1500000000007
0.0
7600258.4847715655
```

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