



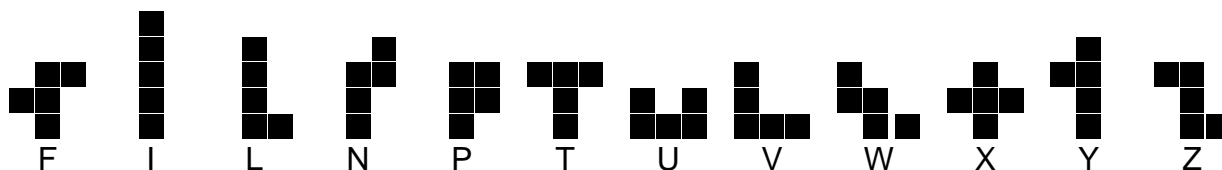
# Computer Science Olympiad

Pennsylvania State University  
Hazleton Campus  
First Round, Spring 2013

**Deadline:** February 21, 2013

**Definition**

A *pentomino* is a geometric shape formed by adjoining five squares with one another edge to edge. There are twelve unique ways to do this (not counting rotations and reflections). Those twelve pieces are pictured here and make up the "classic" set of pentominoes. Traditionally, each piece is named using the letter of the alphabet which most closely resembles its shape:



<http://www.ericharshbarger.org/pentominoes/>

**Problem [Pentomino Recognition]**

Given is a grid  $G$  of size  $n \times n$  ( $5 < n < 26$ ) and an X-shape pentomino. Write a program which:

1. In each row of the grid  $G$ , randomly fills the grid's cell with asterisks, "\*". The number of the asterisk in a row should be between 65% and 75% of the row size and the rest of the squares remain empty (see Figure 1,  $n = 8$ ).
2. Recognizes all the shapes filled with asterisks which are similar to the X-shape pentomino and do not intersect each other. However, adjacent edges are allowed for the separate pentominos (see Figure 2). The squares of every recognized pentomino are filled with a character different from asterisk and different from the characters used before to mark the other recognized pentomino (see Figure 2,  $n = 8$ ).
3. Displays the total number of recognized pentominos and the grid  $G$  containing the information after the process of pentomino recognition.

*	*		*		*	*	*
*	*	*		*	*	*	
	*	*	*	*	*	*	
*	*	*	*	*	*		
*			*	*	*	*	*
*	*	*	*		*	*	
*	*	*			*	*	*
*	*		*	*	*	*	

Figure 1.

*	A		*		B	*	*
A	A	A		B	B	B	
	A	*	C	*	B	*	
*	*	C	C	C	D		
*			C	D	D	D	*
*	E	*	*		D	F	
E	E	E			F	F	F
*	E		*	*	*	F	

Figure 2.

*Input data:*

$n$  – An integer which indicates the size of the grid  $G$ .

*Program output:*

The output corresponds to the requirements from Section 3 written above.