WPF SUDOKU/PUZZLE GRAND PRIX 2019

WPF PUZZLE GP 2019 COMPETITION BOOKLET

Host Country: India

Ashish Kumar, Rakesh Rai, Prasanna Seshadri, Amit Sowani

Special Notes: None.

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1. Simple Loop [Ashish Kumar] (4 points)

Draw a single closed loop (without intersections or crossings) through the centers of all white cells. Loop paths must be orthogonal.

The letters in the grid are for Answer purposes only.

Answer: Starting at the "A" in the upper-left and heading to the right, enter all the letters in the grid in the order in which the loop encounters them, ending at the letter "A" (again).

Example Answer: ACEDBA

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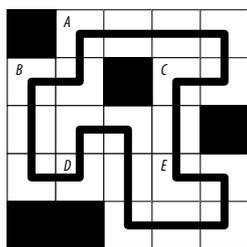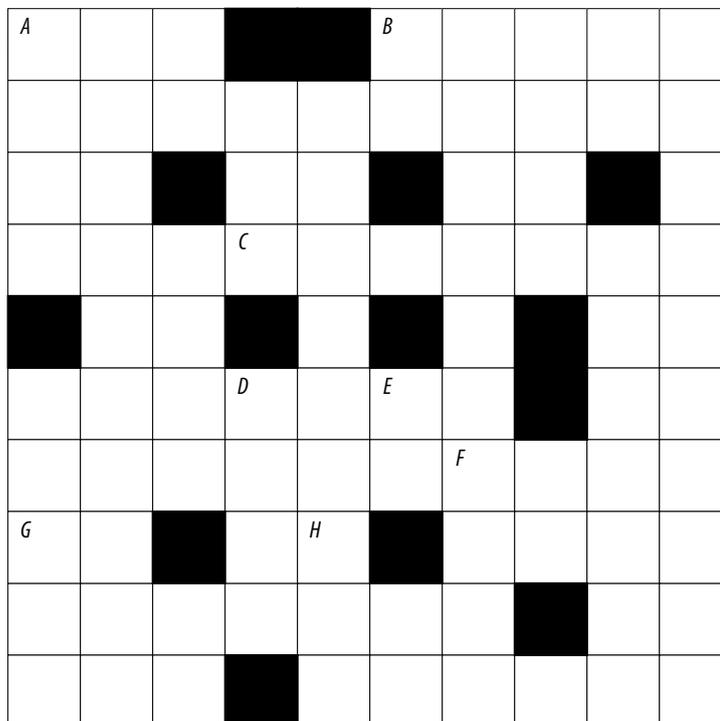**GRAND PRIX**
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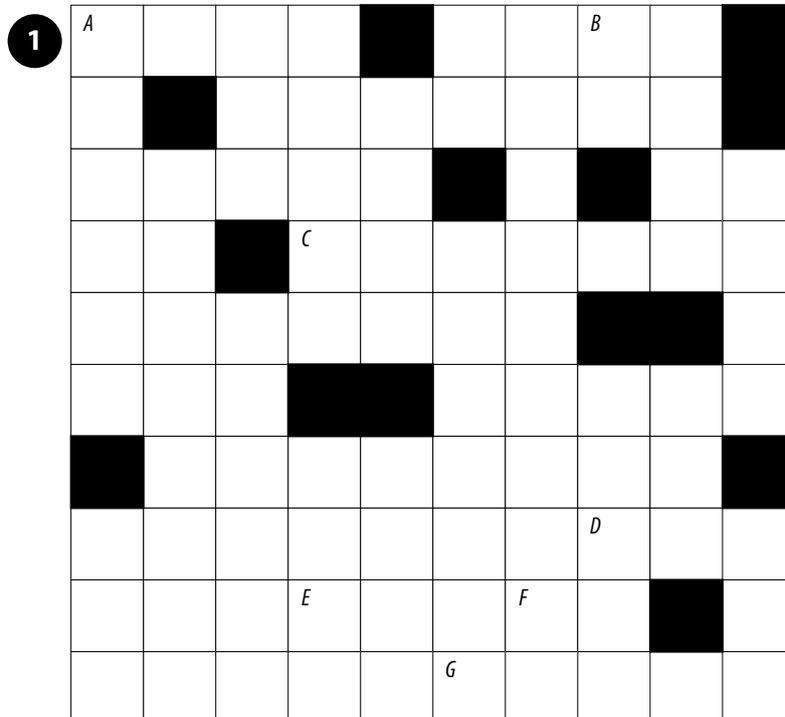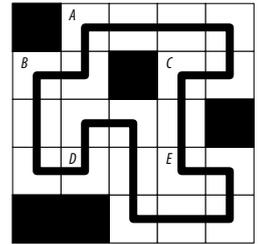
2. Simple Loop [Ashish Kumar] (7 points)

Answer: Starting at the "A" in the upper-left and heading to the right, enter all the letters in the grid in the order in which the loop encounters them, ending at the letter "A" (again).
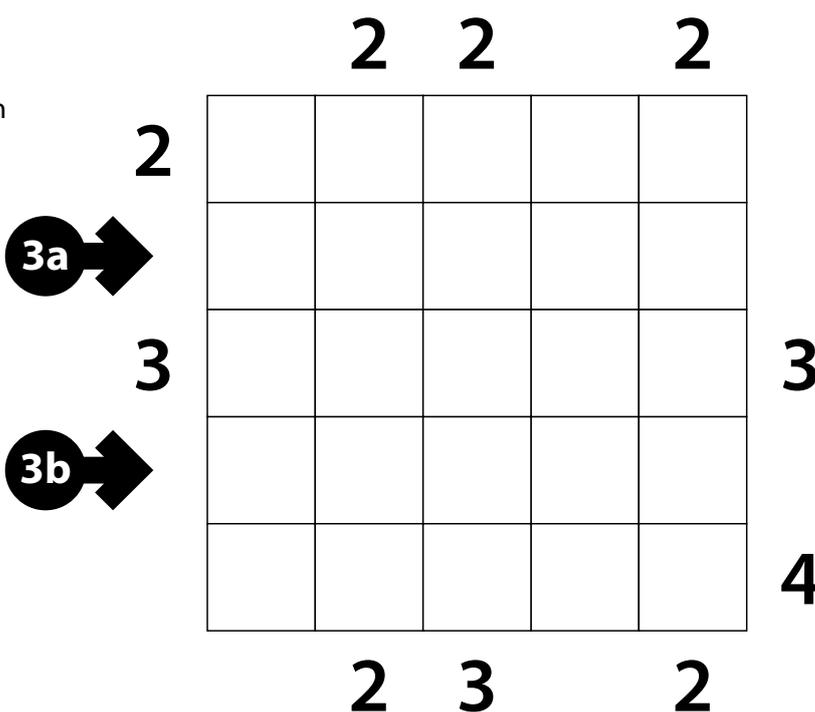
Example Answer: ACEDBA

3. Skyscrapers [Amit Sowani] (8 points)

Place a number from 1 to X (integers only) into each cell so that each number appears exactly once in each row and column. (X is the number of cells in each row.) Each number represents a skyscraper of its respective height. The numbers outside the grid indicate how many skyscrapers can be seen in the respective row or column from the respective direction; smaller skyscrapers are hidden behind higher ones. Some numbers may already be filled in for you.

Answer: For each designated row, enter its contents. Do *not* include any numbers outside the grid.

Example Answer: 45312,23541

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4. Skyscrapers [Amit Sowani] (18 points)

Answer: For each designated row, enter its contents. Do *not* include any numbers outside the grid.
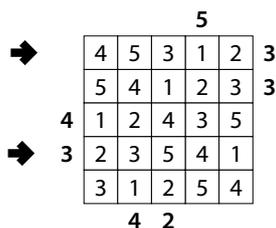
Example Answer: 45312,23541

5. Skyscrapers (Encoded) [Amit Sowani] (70 points)

Place a number from 1 to X (integers only) into each cell so that each number appears exactly once in each row and column. (X is the number of cells in each row.) Each number represents a skyscraper of its respective height. The (encoded) numbers outside the grid indicate how many skyscrapers can be seen in the respective row or column from the respective direction; smaller skyscrapers are hidden behind higher ones. Some numbers may already be filled in for you.

Each number has been encoded to a different letter, and each letter stands for a different number. The mapping has not been supplied for you.

Answer: For each designated row, enter its contents (as numbers). Do *not* include any numbers outside the grid.

Example Answer: 45312,23541

6-7. Shikaku (Off-by-One) [Amit Sowani] (18, 20 points)

Divide the grid into rectangles along the grid lines such that each cell is in exactly one rectangle and each rectangle contains exactly one given number. The number must be exactly 1 more or 1 less than the area of the rectangle (in cells). A square is considered a rectangle for purposes of these instructions.

The dots in cells are only used for entering your answers.

Answer: Enter the number in the rectangle each dot is in, reading the dots from left to right. (Ignore which row the dots are in.) Use only the last digit for two-digit numbers; e.g., use '0' for a rectangle with a 10 inside it.

Example Answer: 177518

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8-9. Products (Off-by-One) [Amit Sowani, Rakesh Rai] (31, 95 points)

Place the specified list of numbers into some cells so that each number is in exactly one cell, and no cell has more than one number. (Most cells will remain empty). Each row and each column must contain exactly two numbers. Numbers outside the grid, when given, are 1 more or 1 less than the product of the two numbers in that row or column.
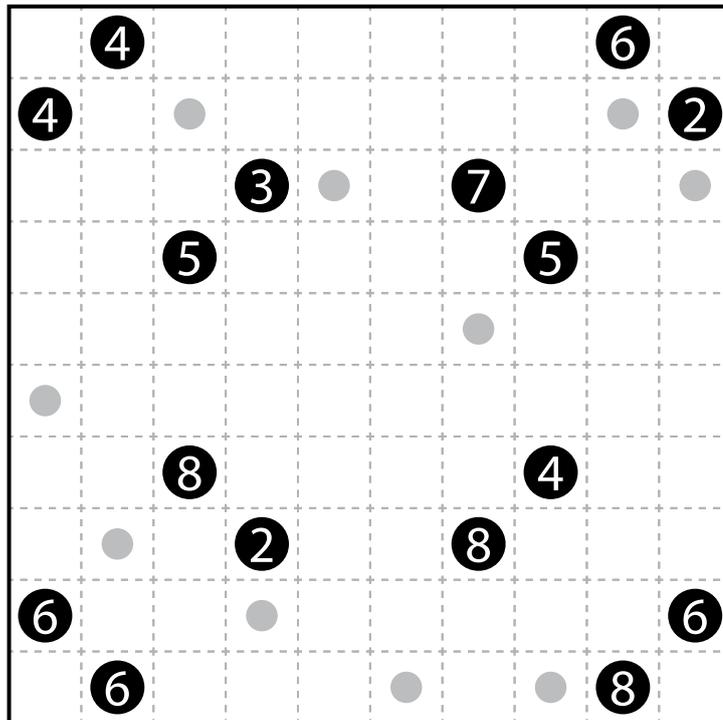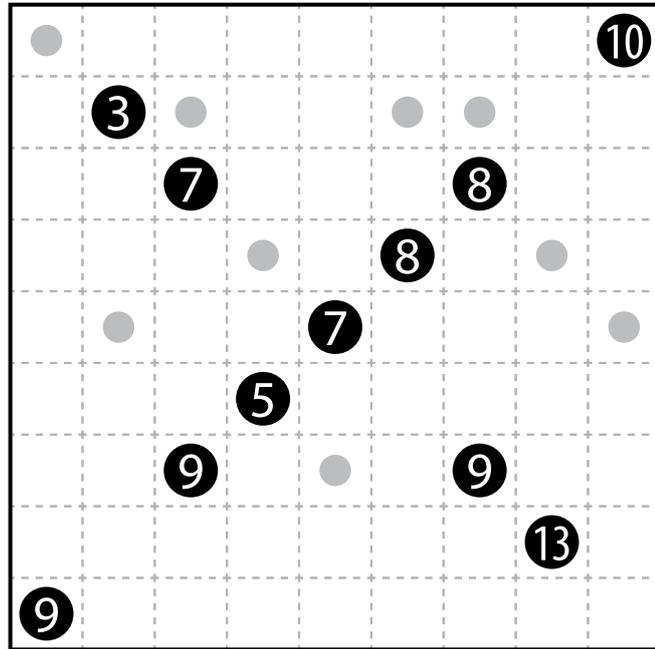
The small letters on top of the diagram are for Answer purposes only.

Answer: For each row from top to bottom, enter the letter of the first non-empty cell from the left (the small letter on top of that column).

Example Answer: BCABA

{1−10}

	A	B	C	D	E
	21	35	41	25	
19		4			5
5			6		1
81	10			8	
26		9		3	
15	2		7		

8 {1−12}

	A	B	C	D	E	F
	4	23	34	43	49	89
11						
13						
21						
41						
61						
71						

9 {1−11, 14-16, 18, 20}

	A	B	C	D	E	F	G	H
	59	89	109	179		9	19	29
9								
19								
29								
159								
49								
69								
89								
199								

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10-11. Tapa [Prasanna Seshadri] (17, 37 points)

Shade some empty cells black; cells with numbers cannot be shaded. All black cells connect along edges to create a single connected region. (It is permissible for the region to touch itself at a corner, but touching at a corner does not connect the region.) No 2×2 group of squares can be entirely shaded black.
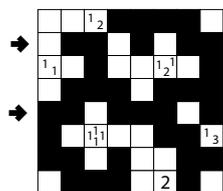
Numbers in a cell indicate the lengths of contiguous black cell groups along the "ring" of 8 cells touching that cell (fewer for cells along the outside edge). If there is more than one number in a cell, then there must be at least one white (unshaded) cell between the black cell groups. The numbers are given in *no particular order*. As a special case, if the number given in a cell is a zero (0), it means that none of the cells around that cell may be shaded black.

Answer: For each designated row, enter the length in cells of each of the shaded segments from left to right. Use only the last digit for two-digit numbers; e.g., use '0' for a segment of size 10. If there are no black cells in the row, enter a single digit '0'.
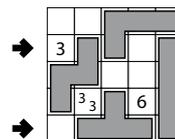
Example Answer: 212,231

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12. Tapa (LITS) [Prasanna Seshadri] (67 points)

Shade some empty cells black (cells with numbers cannot be shaded). All black cells connect along edges to create a single connected region. (It is permissible for the region to touch itself at a corner, but touching at a corner does not connect the region.) No 2×2 group of squares can be entirely shaded black.

Numbers in a cell indicate the lengths of contiguous black cell groups along the "ring" of 8 cells touching that cell (fewer for cells along the outside edge). If there is more than one number in a cell, then there must be at least one white (unshaded) cell between the black cell groups. The numbers are given in *no particular order*. As a special case, if the number given in a cell is a zero (0), it means that none of the cells around that cell may be shaded black.

It must be possible to divide the shape of the shaded cells into only tetrominoes such that when two tetrominoes share an edge, they are not of the same shape, regardless of rotations or reflections. (Not all four possible shapes have to be present in the grid; for example, it is possible for your solution to not have any "I" shapes.)

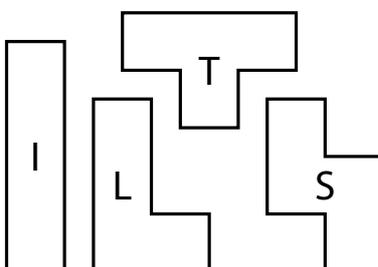*A list of shapes to the letters "LITS" is provided. This is only needed for entering your answer.*

Answer: For each designated row, enter its contents from left to right. For each cell, its contents are the letter of the tetromino occupying that cell, or the letter 'X' if the cell is empty (or contains numbers).

Example Answer: `XSLXI,XTTTI`

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13. Snake (Myopia) [Prasanna Seshadri] (13 points)

Locate a "snake" in the grid. The snake is a path that starts in a cell, goes through some number of cells orthogonally, and ends in a cell. Each cell is used at most once by the snake. The snake may not loop around to touch itself, not even diagonally. (In other words, if two cells in the snake touch orthogonally, then they must be exactly one cell apart along the path of the snake, and if two cells in the snake touch diagonally, then they must be exactly two cells apart along the path of the snake.)
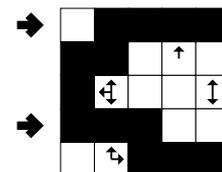
Arrows in a cell indicate *all* closest snake-filled cells to that cell along the four orthogonal directions (if there are multiple snake-filled cells of the same closest distance to the cell, there will be multiple arrows). The snakes cannot occupy cells with arrows.

The two cells containing the ends of the snake are not given.

Answer: For each designated row, enter its contents. Use O for a cell occupied by the snake and X for a cell not occupied by the snake. You may swap O and X , as long as you are consistent.

Example Answer: XOOOO,OOOXX (or OXXXX, XXXOO)

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14-15. Pentominoes (Myopia) [Prasanna Seshadri] (34, 27 points)

Shade some empty cells black so that the black cells form the shapes of some pentominoes. Each pentomino shape is used at most once, but can be rotated or reflected. Pentominoes cannot touch along edges or corners. Arrows in a cell indicate *all* closest shaded cell(s) to that cell along the four orthogonal directions (if there are multiple cells of the same closest distance to the cell, there will be multiple arrows).

The letters for the pentominoes, as will be provided in the diagram, are only used for entering your answer.
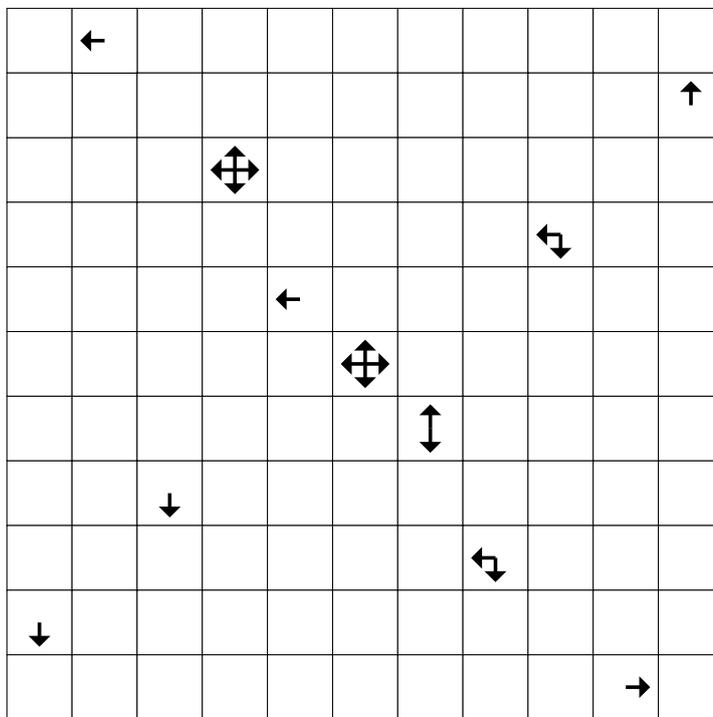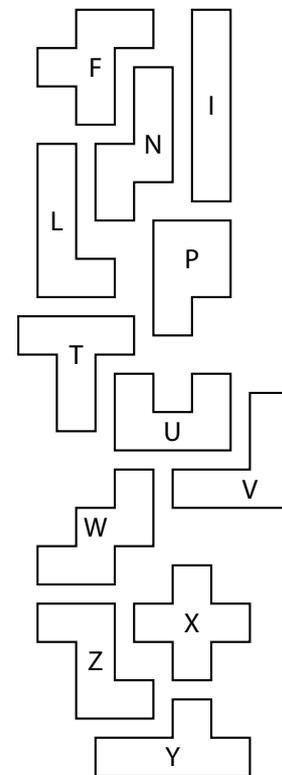
Answer: For each designated row, enter the letter for each pentomino that appears in that row, from left to right. Within a row, if a pentomino occupies more than one cell, only enter that pentomino's letter once. If there are no pentominoes in that row, enter a single letter 'A'.

Example Answer:
PW,A,L

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16-17. Yajilin [Ashish Kumar] (31, 47 points)

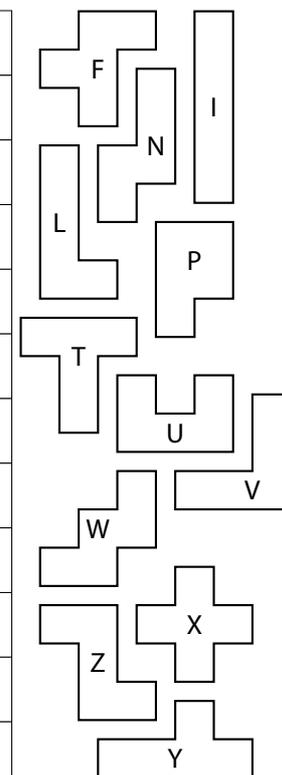Blacken some white cells and then draw a single closed loop (without intersections or crossings) through all remaining white cells. Loop paths must be orthogonal. Blackened cells cannot share an edge with each other. Some cells are outlined and in gray and cannot be part of the loop. Numbered arrows in such cells indicate the total number of blackened cells along the direction of the arrow, starting in the arrowed cell and going along a row or column to the edge of the grid.

The numbers on top of the diagram are for Answer purposes only.

Answer: For each row from top to bottom, enter the column number of the left-most blackened cell. (Outlined gray cells are not blackened.) Use only the last digit for two digit numbers; e.g., use '0' for column 10. If none of the cells in a row are blackened, enter '0' for that row.

Example Answer: 035353

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18. Yajilin (Battleships) [Ashish Kumar] (51 points)

Locate the indicated fleet in the grid. Each piece of a ship occupies a single cell. A cell that does not contain a ship piece is considered "sea". Ships can be rotated. Ships do not touch each other, not even diagonally (that is, if two ship pieces are in adjacent cells, they must be part of the same ship). Some cells are outlined and in gray and cannot be occupied by ships. Numbered arrows in such cells indicate the total number of cells occupied with a ship piece along the direction of the arrow, starting in the arrowed cell and going along a row or column to the edge of the grid.

Then, draw a single closed loop (without intersections or crossings) through all remaining white cells (not including outlined gray cells). Loop paths must be orthogonal.

The numbers on top of the diagram are for Answer purposes only.

Answer: For each row from top to bottom, enter the number of the first column from the left where a ship piece appears (the number on top of that column). Use only the last digit for two-digit numbers; e.g., use '0' if the first ship piece appears in column 10. If the row is empty, enter '0'.

Example Answer: 2422200

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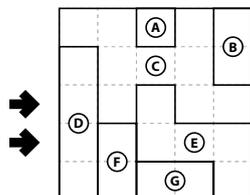## 19-20. Spiral Galaxies [Rakesh Rai] (44, 46 points)

Divide the grid into polyomino-shaped regions such that each cell is in exactly one region. You may only draw on the grid, as indicated by the dotted lines. Each region must be rotationally symmetric and contain exactly one circle at the point of symmetry.

The letters inside the circles are for Answer purposes only.

Answer: For each designated row, enter the letter for each cell, from left to right. The letter of a cell is the letter inside the circle that is the point of symmetry for the region that contains that cell.
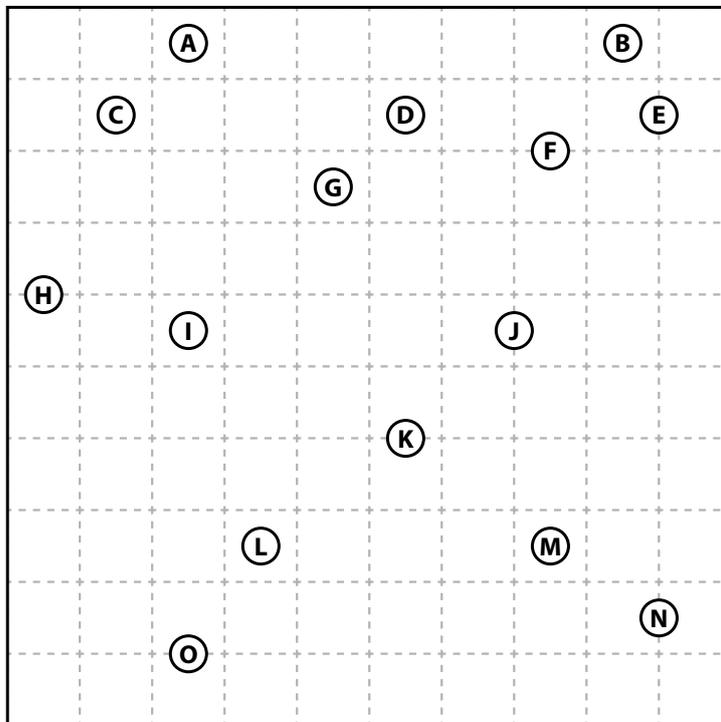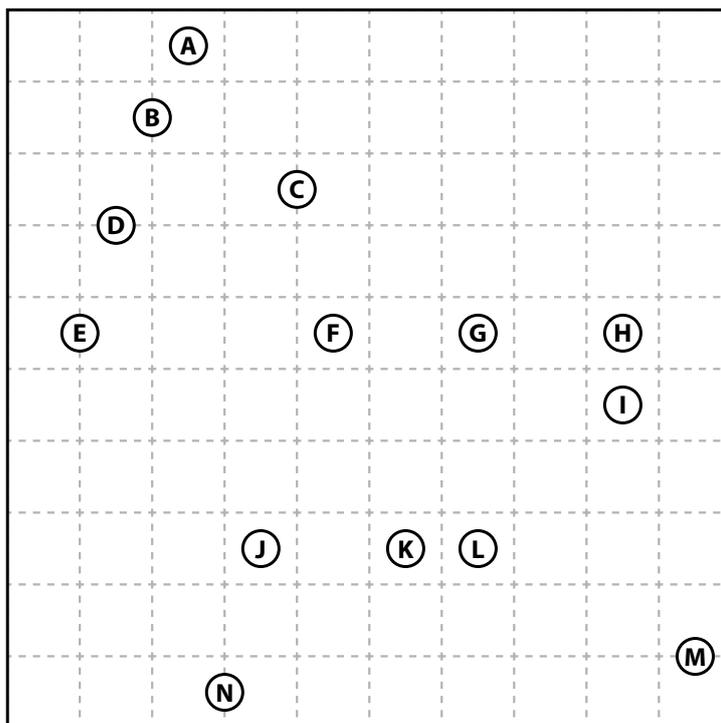
Example Answer:
DCECC, DFEEE

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**21. Spiral Galaxies (Tetrominoes) [Rakesh Rai] (79 points)**

Divide the grid into polyomino-shaped regions such that each cell is in exactly one region. You may only draw on the grid, as indicated by the dotted lines. Each region is either a "galaxy" or a "shaded tetromino". Each galaxy must be rotationally symmetric and contain exactly one dot at the point of symmetry. Each tetromino shape is used as a shaded tetromino at most once, but can be rotated or reflected. Shaded tetrominoes cannot touch along edges or corners. Some shaded tetromino cells may be given to you.
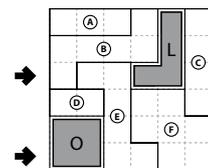
The letters inside the dots are for Answer purposes only. The letters for the tetrominoes, as will be provided in the diagram, are only used for entering your answer.

Answer: For each designated row, enter the letter for each cell, from left to right. The letter of a cell is the letter inside the dot that is the point of symmetry for the galaxy that contains that cell, or the letter corresponding to the shape of the shaded tetromino containing that cell.

Example Answer: BEELLC,OOEEFF