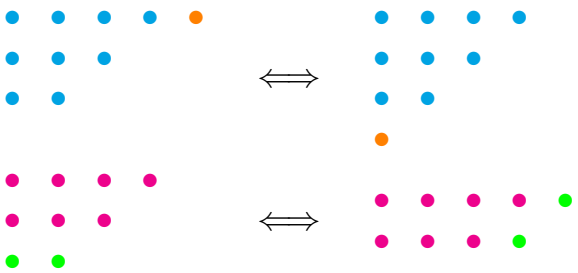
Pentagonal Peculiarity

Consider diagrams which depict dots in a series of (left-aligned) rows, with each row having strictly less dots than the one above. The number of such diagrams with n dots and an even number of rows let's denote E, and the number of those with an odd number of rows let's denote O.

Problem. Explain why E and O differ by at most 1 (for any n).



Hint. Above is an illustration of how a diagram with an odd number of rows can be converted into one with an even number of rows, or vice versa: by pouring the right diagonal into the last row, or conversely scooping the last row into the right diagonal (depending on which has more dots). But this procedure doesn't always work though... Try lots of examples to see! (Note the term "pentagonal" is not a hint and does not refer to diagram shapes.)

Submit your solution online by scanning QR code and filling out the form, or submit at

`sites.google.com/unomaha.edu/unopow`

A photo of handwritten work is fine. You can also turn in solutions physically at the UNO math department's mail room (located on the second floor of the Durham Science Center).