Problem B1

(4) The two rows given can be obtained by applying the following row operations respectively: $-2A_1 + A_3$ and $0.5(3A_1 - A_3)$. Denoting those two rows as B_1 and B_2, A_2 can be expressed as $2B_1 + 3B_2$. In fact, every subsequent row A_n can be expressed as $nB_1 + (n+1)B_2$.

Problem B3

(4) There are no normal magic squares for $n = 2$. By the property of magic squares, given $A = \begin{pmatrix} a_1 & a_2 \\ a_3 & a_4 \end{pmatrix}$ it must be the case that $a_1 + a_2 = a_1 + a_3$. However, this is equivalent to $a_2 = a_3$, which violates the constraint that all the elements must be distinct.

$$\begin{aligned}
1 + ... + 3^2 &= \frac{2x_1 + 2x_2 - x_3 + 2x_1 - x_2 + 2x_3}{3} \\
&+ \frac{-x_1 + 2x_2 + 2x_3 - 2x_1 + x_2 + 4x_3 + x_1 + x_2 + x_3 + 4x_1 + x_2 - 2x_3}{3} \\
&+ x_1 + x_2 + x_3 \\
45 &= 3x_1 + 3x_2 + 3x_3 \\
15 &= x_1 + x_2 + x_3
\end{aligned}$$

Extra Credit From the above, we know that the center cell must be 5 and each row and column must add up to 15. Also, $x_1 \neq x_2$, otherwise the cells would have repeat values. Now, without loss of generality, let $x_2 < x_1$. Up to rotation, we can see that the middle element of each row/column can take on the value 9. By performing case analysis on each of the four locations where 9 could be, we see that all solutions are isomorphic up to rotation and reflection.