Exercise 1. Determine whether or not the matrix

$$\begin{pmatrix} 2117 & 3218 & 5344 & 7511 & 1007 \\ 9101 & 4800 & 6911 & 3578 & 8113 \\ 1212 & 9014 & 4216 & 3178 & 2013 \\ 3516 & 1019 & 2114 & 6104 & 3416 \\ 5789 & 7534 & 7114 & 1472 & 8300 \end{pmatrix}$$

has an inverse.

Exercise 2. Prove that $\dfrac{x^5}{5} + \dfrac{x^3}{3} + \dfrac{7x}{15}$ is an integer for every integral value of x.

Exercise 3. Prove that every positive integer has a multiple whose decimal representation involves all ten digits. [Putnam 1956, 2]

Exercise 4. Show that if $D \notin \{2, 5, 13\}$, then there exist $A, B \in \{2, 5, 13, D\}$ so that $A \neq B$ and $AB - 1$ is not a perfect square.