1. One out of 12 coins is counterfeited. It is known that its weight differs from the weight of a valid coin but it is unknown whether it is lighter or heavier. How to detect the counterfeited coin with the help of four trials using only a two-pan balance without weights?

2. Below a 3 digit number $cde$ is multiplied by a 2 digit number $ab$. Find all solutions $a, b, c, d, e, f, g$ if it is known that they represent distinct digits.

\[
\begin{array}{c}
\times \\
\hline \\
\end{array}
\begin{array}{cc}
c & d & e \\
\hline \\
a & b \\
\end{array}
\begin{array}{c}
\hline \\
f & e & g \\
\hline \\
\end{array}
\]

\[
\begin{array}{c}
+ \\
\hline \\
\end{array}
\begin{array}{ccc}
c & d & e \\
\hline \\
b & b & c & g \\
\end{array}
\]

3. Find all integer $n$ such that

\[
\frac{n + 1}{2n - 1}
\]

is an integer.

4. There are several straight lines on the plane which split the plane in several pieces. Is it possible to paint the plane in brown and green such that each piece is painted one color and no pieces having a common side are painted the same color?