Homework 1

1. For each of the rational numbers below, find the decimal expansion.

\[
\begin{array}{cccccc}
33 & 3 & 8 & 11 & 9 & 3 \\
40 & 7 & 21 & 13 & 14 & 19 \\
\end{array}
\]

2. For each of the repeating decimals below, express the rational number as a quotient of integers, reduced to lowest terms.

\[
.315285714 \\
.3214193 \\
.190476
\]

3. Suppose \(m\) is an integer that gives remainder 3 when divided by 5 and \(n\) is an integer that gives remainder 2 when divided by 5. Is it possible for \(mn\) to be divisible by 5? (Give an example that illustrates it if ‘yes’ and a proof to show the answer is ‘no’ if you say so.) More generally, what can you say about the possibilities when dividing \(mn\) by 5. (Give a proof of your assertion.)

4. Let \(q\) be an integer. Show (‘show’ means ‘prove’) that the remainder when dividing \(q^2\) by 7 cannot be 3.

5. Let \(q\) be an integer. Give examples and proofs to describe the possibilities for the remainder when dividing \(q^2\) by 7.