## Homework 1

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

$$\frac{33}{40} \quad \frac{3}{7} \quad \frac{8}{21} \quad \frac{11}{13} \quad \frac{9}{14} \quad \frac{3}{19}$$

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

$$.315\overline{285714} \quad\quad 3.21\overline{4193} \quad\quad \overline{.190476}$$

**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.