

The subtraction trick:

$$\begin{array}{rcl}
 r = 3.\overline{14} & & 100r = 314.\overline{14} = 314.141414\dots \\
 & & -r = -3.\overline{14} = -3.141414\dots \\
 \hline
 & & 99r = 311 = 311.000000\dots \\
 & & r = \frac{311}{99}
 \end{array}$$

$$\begin{array}{rcl}
 r = 0.\overline{142857} & & 1000000r = 142857.\overline{142857} = 142857.142857142857\dots \\
 & & -r = -0.\overline{142857} = -0.142857142857\dots \\
 \hline
 & & 999999r = 142857 = 142857.000000000000\dots \\
 & & r = \frac{142857}{999999}
 \end{array}$$

$$\begin{array}{rcl}
 r = 3.45\overline{6} & & 1000r = 3456.\overline{6} = 3456.66666\dots \\
 & & -100r = -345.\overline{6} = -345.66666\dots \\
 \hline
 & & 900r = 3111 = 3111.00000\dots \\
 & & r = \frac{3111}{900}
 \end{array}$$