

Steps for Polynomial Division

$$\frac{p(x)}{q(x)} \leftarrow \begin{array}{l} \text{numerator} \\ \text{denominator} \end{array}$$

① Write $q(x) \overline{) p(x)}$

② Divide leading term of numerator by leading term of $q(x)$. Write answer on top.

③ Multiply answer from ② and $q(x)$. Write answer below.

④ Subtract answer from ③ from numerator. Write answer below.

If answer from ④ has smaller degree than $q(x)$:

STOP. Answer from ④ is your remainder. $\frac{p(x)}{q(x)}$ is sum of terms on top plus $\frac{\text{remainder}}{q(x)}$.

If answer from ④ has the same or larger degree than $q(x)$:

Treat answer from ④ as the numerator and repeat ②, ③, ④.

$$\frac{10x^2+7x-2}{2x-5}$$

① $2x-5 \overline{) 10x^2+7x-2}$

② $\frac{10x^2}{2x} = 5x$

$$2x-5 \overline{) 10x^2+7x-2} \quad \begin{array}{r} 5x \\ \hline \end{array}$$

③ $(5x)(2x-5) = 10x^2 - 25x$

$$2x-5 \overline{) 10x^2+7x-2} \quad \begin{array}{r} 5x \\ \hline 10x^2-25x \\ \hline \end{array}$$

④ $2x-5 \overline{) 10x^2+7x-2} \quad \begin{array}{r} 5x \\ \hline -(10x^2-25x) \\ \hline 32x-2 \end{array}$

② $\frac{32x}{2x} = 16$

$$2x-5 \overline{) 10x^2+7x-2} \quad \begin{array}{r} 5x \quad 16 \\ \hline -(10x^2-25x) \\ \hline 32x-2 \end{array}$$

③ $16(2x-5) = 32x - 80$

$$2x-5 \overline{) 10x^2+7x-2} \quad \begin{array}{r} 5x \quad 16 \\ \hline -(10x^2-25x) \\ \hline 32x-2 \\ 32x-80 \\ \hline \end{array}$$

④ $2x-5 \overline{) 10x^2+7x-2} \quad \begin{array}{r} 5x \quad 16 \\ \hline -(10x^2-25x) \\ \hline 32x-2 \\ -(32x-80) \\ \hline 78 \end{array}$

Answer: $\frac{10x^2+7x-2}{2x-5} = 5x+16 + \frac{78}{2x-5}$