LARSON—MATH 591—CLASSROOM WORKSHEET 14
Dividing Polynomials

The Division Algorithm says that, given polynomials $f, g \in \mathbb{R}[x]$, there are unique polynomials $q, r \in \mathbb{R}[x]$, such that $f = gq + r$ (or $f(x) = g(x)q(x) + r(x)$) such that the degree of $r$ is less than the degree of $g$.

Here $g$ is the divisor, $q$ is the quotient and $r$ is the remainder.

1. Let $f = 2x^3 + 5x^2 + 5x + 2$ and let $g = x + 1$. Divide $f$ by $g$: use long division of polynomials to find $q$ and $r$. 
2. Let \( f = x^7 + 3x^5 + 2x^3 + 2x^2 + 1 \) and let \( g = x + 1 \). Divide \( f \) by \( g \): use long division of polynomials to find \( q \) and \( r \).