MATH135 Factoring Polynomials

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1 DAP proof

Induction on degree of f(x).

1. f(x) is 0 polynomial.
2. deg(g(x)) is zero. say $g(x) = \beta(constant)$ take $q(x) = \frac{f(x)}{\beta}, r(x) = 0$
3. $\deg g(x) > \deg f(x)$ Take q(x)=0 r(x)=f(x)

Assume $\deg g(x) = m > 0$
Strong Induction Hypothesis: For some $k \geq m$ assume result holds for all polynomials of f(x)of $deg < k_0$
Inductino Step consider $f(x) - \frac{a_k}{b_m} x^{k-m} g(x)$; this has degree < k. Therefore by Induction hypothesis, it can be written as:$q(x)g(x) + r(x)$. Thus $f(x) = (\frac{a_k}{b_m} x^{k-m} + q(x))g(x) + r(x)$