



STEP II, 2012 Q2

2 If $p(x)$ and $q(x)$ are polynomials of degree m and n , respectively, what is the degree of $p(q(x))$?

(i) The polynomial $p(x)$ satisfies

$$p(p(p(x))) - 3p(x) = -2x$$

for all x . Explain carefully why $p(x)$ must be of degree 1, and find all polynomials that satisfy this equation.

(ii) Find all polynomials that satisfy

$$2p(p(x)) + 3[p(x)]^2 - 4p(x) = x^4$$

for all x .



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