# Polynomials - Exercises (1 page; 14/1/20)

## Key to difficulty:

* introductory exercise

** light A Level (FM) standard

*** harder A Level (FM) standard

**** harder than A Level (FM)

(1***) What is the minimum value of $(x^2 - 4x + 3)(x^2 + 4x + 3)$, where $x$ can be any real number? (without using Calculus)

(2***) (i) Factorise (a) $x^3 - y^3$ (b) $x^3 + y^3$

(ii) Can $3^{54} - 2^{54}$ be prime?

(3***) (i) Find an expansion for $(a + b + c)^3$, and give a justification for the coefficients.

(ii) Extend this to $(a + b + c)^4$

(4*) What can be said about the graph of $f(x)$ if $(x - a)^n$ is a factor of $f(x)$, where $f(x)$ is a polynomial function and $n \in \mathbb{Z}^+$?