

## Polynomials - Exercises (1 page; 21/3/20)

### Key to difficulty:

\* easier

\*\* moderate

\*\*\* harder

(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  $n \in \mathbb{Z}^+$ ?