Edexcel AS Mathematics Polynomials

Section 1: Polynomial functions and graphs

Exercise level 2

1. Expand the brackets and simplify the following as far as possible:
   (i) $(3x^2 - x + 2)(2x^2 + 5x - 1)$
   (ii) $(2x + 3)(x - 2)(x^2 + 1)$

2. Sketch the following graphs:
   (i) $y = x(3 - x)(2x + 3)$
   (ii) $y = x^2(x - 2)(x + 3)$
   (iii) $y = (x - 2)^2(3x + 4)^2$

3. Given that $\mathrm{f}(x) = x^2 + x + 1$ and $\mathrm{g}(x) = 2x^4 - x^3 + 2$ find
   (i) $[\mathrm{f}(x)]^2$
   (ii) $\mathrm{g}(x) - \mathrm{f}(x)$
   (iii) $\mathrm{f}(x)\mathrm{g}(x)$
   (iv) $\mathrm{f}(x)\big(\mathrm{g}(x) - \mathrm{f}(x)\big)$

4. Sketch a possible graph of $y = \mathrm{f}(x)$ where $\mathrm{f}(x)$ is a degree 4 polynomial and the equation $\mathrm{f}(x) = 0$ has
   (i) exactly 4 real roots
   (ii) exactly 1 real root and two local minimum points
   (iii) exactly 2 real roots and two local maximum points