Section 1: The shape of curves

Exercise level 1

1. For the given point on each curve, determine whether the curve is concave or convex.
    (i) $y = x^3 + 2x^2 - 1$ at the point where $x = 1$
    (ii) $y = 2x^3 - 3x^2 + 4x$ at the point where $x = 0$
    (iii) $y = x^4 + 3x^2 - 1$ at the point where $x = -2$

2. Find the coordinates of any non-stationary points of inflection on the following curves.
    (i) $y = x^3 - 3x^2 + 2x + 1$
    (ii) $y = 3x^3 - 4x + 2$
    (iii) $y = x^4 + 3x^3 - 6x^2 + 2x - 1$

3. Show that the curve $y = x^3 + 3x^2 + 3x + 4$ has a stationary point of inflection, and find its coordinates.