12.9) Stationary points

Worked example	Your turn
Find the least value of $f(x) = x^2 + 6x - 9$	Find the least value of $f(x) = x^2 - 4x + 9$ 5

Worked example	Your turn
Find the turning point of $y = \sqrt[4]{x} - 2x$	Find the turning point of $y = \sqrt{x} - x$ $\left(\frac{1}{4}, \frac{1}{4}\right)$

Worked example	Your turn
Find the coordinates of the turning/stationary point(s) of the curves by differentiation: $y = x^2 + 6x - 2$ $y = 2x^3 + 6x^2 - 4$	Find the coordinates of the turning/stationary point(s) of the curves by differentiation: $y = x^3 + 3x^2 - 4$ $(-2, 0)$ and $(0, -4)$

Worked example	Your turn
Find the coordinates of the turning/stationary point(s) of the curves by differentiation: $y = \frac{2}{3}x^3 - 3.5x^2 + 3x + 5$	Find the coordinates of the turning/stationary point(s) of the curves by differentiation: $y = x^3 + \frac{1}{2}x^2 - 2x + 4$ $(-1, \frac{11}{2})$ and $(\frac{2}{3}, \frac{86}{27})$

Worked example	Your turn
Find the stationary points on the curve $y = \frac{5}{3}x^3 - 80x$	Find the stationary points on the curve $y = x^3 - 12x$ $(-2, 16)$ and $(2, -16)$

Worked example

Find the stationary point on the curve with equation
$y = x^4 - 108x$, and determine whether it is a local maximum, a local minimum or a point of inflection.

Your turn

Find the stationary point on the curve with equation
$y = x^4 - 32x$, and determine whether it is a local maximum, a local minimum or a point of inflection.

$(2, -48)$ Local minimum

Worked example

Find the coordinates of the stationary points on the curve with equation $y = 4x^3 + 30x^2 + 48x - 3$ and use the second derivative to determine their nature

Your turn

Find the coordinates of the stationary points on the curve with equation $y = 2x^3 - 15x^2 + 24x + 6$ and use the second derivative to determine their nature

$(1, 17)$ Local maximum

$(4, -10)$ Local minimum

Worked example

Sketch the graph of $y = \frac{1}{x} + \frac{256}{3}x^3$ labelling the stationary points.

Your turn

Sketch the graph of $y = \frac{1}{x} + 27x^3$ labelling the stationary points.