1 Find the stationary points on the curve $f(x) = 2x^3 - 9x^2 + 12x$ and determine their nature.

$f(x) = 2x^3 - 9x^2 + 12x$

$f'(x) = 6x^2 - 18x + 12$

**Stationary points occur when $f'(x) = 0$

$6x^2 - 18x + 12 = 0$

$6(x^2 - 3x + 2) = 0$

$6(x^2 - 2x - x + 2) = 0$

$6(x(x-2) - 1(x-2)) = 0$

$6(x-1)(x-2) = 0$

$x - 1 = 0 \qquad x - 2 = 0$

$x = 1 \qquad x = 2$

$f(1) = 2(1)^3 - 9(1)^2 + 12(1)$

$f(1) = 5$

(1, 5)

$f(2) = 2(2)^3 - 9(2)^2 + 12(2)$

$f(2) = 4$

(2, 4)

x	→	1	→	2	→
f'(x) = $6x^2 - 18x + 12$	+	0	-	0	+
Slope	/	—	\	—	/

Maximum Turning Point at (1, 5)

Minimum Turning Point at (2, 4)

(2) Find the stationary points on the curve $f(x) = 2x^3 - 3x^2 - 12x + 5$ and determine their nature.

$f(x) =$

$f'(x) =$

**Stationary points occur when $f'(x) = 0$ **

$x = -1$ $x = 2$

$f(-1) =$ $f() =$

x	→	-1	→	2	→
f'(x) =		0		0	
Slope					

3 Find the stationary points on the curve $f(x) = x^3 + x^2 - x - 1$ and determine their nature.

$f(x) =$

$f'(x) =$

**Stationary points occur when $f'(x) = 0$

$x = -1$ $x = \frac{1}{3}$

$f(-1) =$ $f(\frac{1}{3}) =$

x	→	-1	→	$\frac{1}{3}$	→
f'(x) =					
Slope					

4 Find the stationary points on the curve $f(x) = 4x^3 - x^4$ and determine their nature.

$f(x) = 4x^3 - x^4$

$f'(x) = 12x^2 - 4x^3$

**Stationary points occur when $f'(x) = 0$

$12x^2 - 4x^3 = 0$

$4x^2(3 - x) = 0$

$4x^2 = 0$ $3 - x = 0$

$x = 0$ $x = 3$

$f(0) =$ $f(3) =$

x	→		→		→
f'(x) =					
Slope					

Rising Point of Inflection at

Maximum Turning Point at

5 Find the stationary points on the curve $f(x) = x^4 - 4x^3$ and determine their nature.

x	→		→		→
f'(x) =					
Slope					

6 Find the stationary points on the curve $f(x) = x(x-3)^2$ and determine their nature.

7 Find the stationary points on the curve $f(x) = 2x^2 - x^4$ and determine their nature.

$4x - x^3 = 0$

$x(4 - x^2) = 0$

$x(2 - x)(2 + x) = 0$

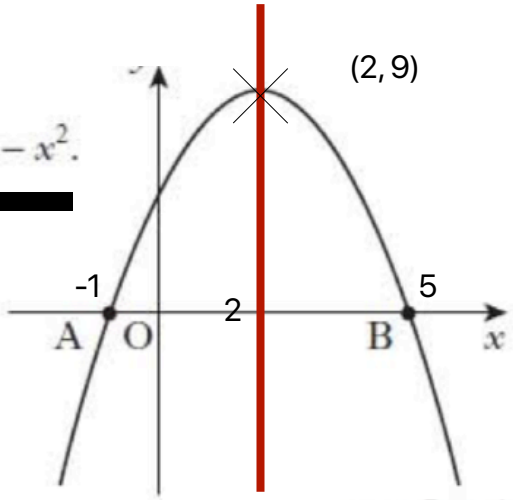
x	→		→		→		→
f'(x) =							
Slope							

7 Find the stationary points on the curve $f(x) = x^2(8 - x^2)$ and determine their nature.

https://startigpointsmaths.com/2020/10/22/scaffolded-stationary-points/

7 Find the stationary points on the curve $f(x) = x^2(8 - x^2)$ and determine their nature.

The diagram shows part of the graph of $y = 5 + 4x - x^2$.



A is the point $(-1, 0)$.

B is the point $(5, 0)$.

$y = 5 + 4x - x^2$

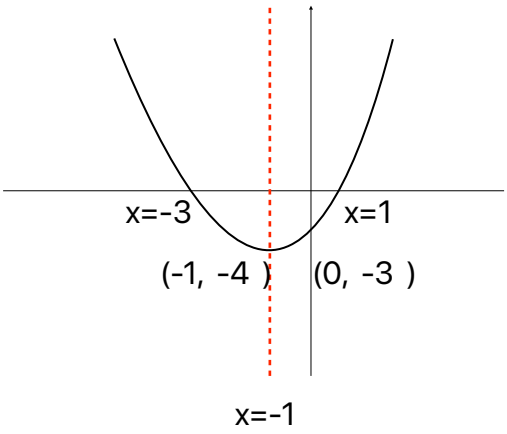
(a) State the equation of the axis of symmetry of the graph. x =2 2KU

(b) Hence, find the maximum value of $y = 5 + 4x - x^2$. 2KU

$$y = x^2 + 2x - 3$$

-3 + 1 = -2

-2/2 = -1



1 -2 - 3 = -4

Roots - >. Quadratic formula, or factorisation and setting = 0

Axis of symmetry -> add the roots and then half the total ... x = something

Turning Point ->. Subbing the axis of symmetry into y = ...

For y -intercept sub in x = 0

$$y = x^2 - 2x - 15$$