

2.  $y = 8 + 2x - x^2$

on  $x$ -axis,  $y = 0$

$\Rightarrow 8 + 2x - x^2 = 0$

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

$\Rightarrow$  Roots at  $x = -2, 4$

$(-2, 0) \text{ \& } (4, 0)$

on  $y$ -axis,  $x = 0$

$\Rightarrow y = 8$

$(0, 8)$

Find intersections with axes

for stat. pts  $\frac{dy}{dx} = 0$

Look for stationary points, i.e. find where the gradient is zero

$\frac{dy}{dx} = 2 - 2x$

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

when  $x = 1,$

$y = 8 + 2(1) - (1)^2$

$y = 9$

Calculate the  $y$ -coordinate of S.P.

$\Rightarrow$  S.P. at  $(1, 9)$

$x$	$\rightarrow$	$1$	$\rightarrow$
$\frac{dy}{dx}$	$+$	$0$	$-$
shape	$/$	$-$	$\backslash$

when  $x = 0,$

$\frac{dy}{dx} = 2 - 2(0)$   
 $= 2$

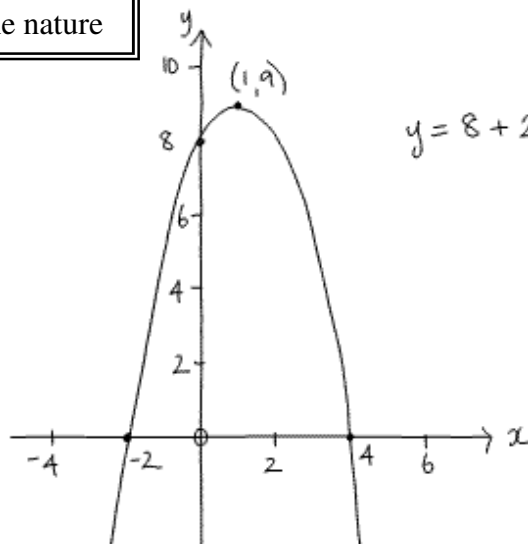
when  $x = 2,$

$\frac{dy}{dx} = 2 - 2(2)$   
 $= -2$

$\Rightarrow$  Maximum T.P. at  $(1, 9)$

To determine the shape (nature) look at gradients slightly left and right of the S.P.

State the nature



Sketch the shape through all the points identified

8.  $y = x^2(3-2x)$

on x-axis,  $y = 0$

$\Rightarrow x^2(3-2x) = 0$

$x^2 = 0$  or  $3-2x = 0$   
 $x = 0$                        $3 = 2x$   
     $\frac{3}{2} = x$

$\Rightarrow$  Roots at  $x = 0, \frac{3}{2}$   
 $(0,0) \neq (\frac{3}{2}, 0)$

Find intersections with axes

on y-axis,  $x = 0$

$\Rightarrow y = (0)^2(3-2(0))$

$y = 0.3$

$y = 0$

$(0,0)$

for stat. pts.  $\frac{dy}{dx} = 0$

Look for stationary points, i.e. find where the gradient is zero

$y = x^2(3-2x)$

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

$\frac{dy}{dx} = 6x - 6x^2$

$\Rightarrow 6x - 6x^2 = 0$

$6x(1-x) = 0$

$6x = 0$  or  $1-x = 0$   
 $x = 0$                        $x = 1$

$\Rightarrow$  s.p.'s at  $(0,0) \neq (1,1)$

when  $x = 0,$

$y = 0$

when  $x = 1$

$y = 3(1)^2 - 2(1)^3$

$y = 1$

Calculate the y-coordinate of S.P.'s

$x$	$\rightarrow 0$	$\rightarrow 1$	$\rightarrow$
$\frac{dy}{dx}$	-	0	+ 0 -
shape	\	-	/ - \

when  $x = -1,$

$\frac{dy}{dx} = 6(-1) - 6(-1)^2$   
 $= -6 - 6$   
 $= -12$

when  $x = \frac{1}{2}$

$\frac{dy}{dx} = 6(\frac{1}{2}) - 6(\frac{1}{2})^2$   
 $= 3 - 6(\frac{1}{4})$   
 $= 3 - \frac{3}{2}$   
 $= \frac{3}{2}$

when  $x = 2$

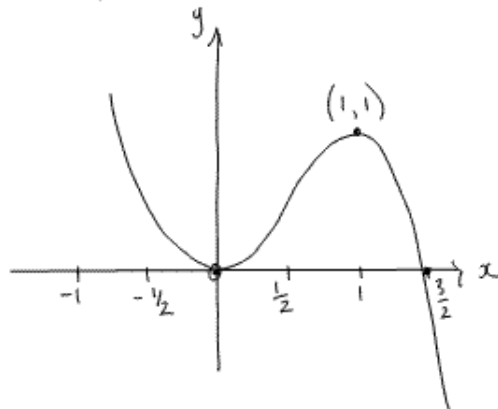
$\frac{dy}{dx} = 6(2) - 6(2)^2$   
 $= 12 - 24$   
 $= -12$

$\Rightarrow$  Minimum T.P. at  $(0,0)$

Maximum T.P. at  $(1,1)$

State the nature

To determine the shape (nature) look at gradients slightly left and right of the S.P.



Sketch the shape through all the points identified