when $x = 1$ and $y = 2$.

$$\frac{dy}{dx} = \frac{-8(1) - 2(2)^3}{6(1)(2)^2 - 10(2)} = \frac{-8 - 16}{24 - 20} = \frac{-24}{4}$$

$$\frac{dy}{dx} = -6$$

$8x + \left(6xy^2\frac{dy}{dx} + 2y^3\right) - 10y\frac{dy}{dx}$

$6xy^2\frac{dy}{dx} - 10y\frac{dy}{dx} = -8x - 2y^3$

$\frac{dy}{dx}\left(6xy^2 - 10y\right) = -8x - 2y^3$

$$\frac{dy}{dx} = \frac{-8x - 2y^3}{6xy^2 - 10y}$$

The nature of Stationary point

$$\frac{d^2y}{dt^2} = \frac{8t^3 - 72t^2 + 216t - 72}{(6-2t)^3}$$

at $t = 0$

$$\frac{d^2y}{dt^2} = \frac{-72}{216} = -\frac{1}{3}$$

at $t=0$, we have maximum point

at $t = 4.3028$

$$\frac{d^2y}{dt^2} = -9.14028$$

at $t = 4.3028$ we have maximum point

at $t = 0.6972$

$$\frac{d^2y}{dt^2} = 0.474$$

at $t = 0.6972$, we have minimum point

1. Stationary point = $t = 0$, $t = \frac{5+\sqrt{13}}{2}$ or $t = \frac{5-\sqrt{13}}{2}$

ii) For the coordinates of stationary point.

At $t = 0$

$$y = \frac{(0)^3 - (0)^2}{2 - 2(0) + 4} = 0$$

At $t = \frac{5+\sqrt{13}}{2}$

$$y = \frac{(4.3028)^3 - (4.3028)^2}{2 - 2(4.3028) + 4} = 61.1483$$

$y = 23.468$

At $t = \frac{5-\sqrt{13}}{2}$; 0.6972

$$y = \frac{(0.6972)^3 - (0.6972)^2}{2 - 2(0.6972) + 4}$$

$y = \frac{-0.03196}{2}$

(0, 0)
(4.3028, 23.468)
(0.6972, -0.03196)

54 ...have a maximum point

$y = \dfrac{t^3 - t^2}{2 - 2t + 4}$

Find i. Stationary point

ii. Coordinates of the stationary point.

iii Nature of the stationary point of the curve.

at stationary point $\dfrac{dy}{dt} = 0$

$\dfrac{dy}{dt} = \dfrac{V\frac{du}{dt} - U\frac{dv}{dt}}{V^2}$ $\quad \dfrac{du}{dt} = 3t^2 - 2t \;\Big|\; \dfrac{dv}{dt} = -2$

$\dfrac{dy}{dt} = \dfrac{2-2t+4(3t^2-2t) - t^3 t^2(-2)}{(2-2t+4)^2}$

$\dfrac{dy}{dt} = \dfrac{6t^2 - 6t^3 + 12t^2 - 4t + 4t^2 + 8t \quad + 2t^3 + 2t^2}{(2-2t+4)^2}$

$\dfrac{dy}{dt} = \dfrac{20t^2 - 4t^3 - 12t}{(6-2t)^2}$

$\dfrac{20t^2 - 4t^3 - 12t}{(6-2t)^2} = 0$; $\dfrac{20t^2 - 4t^3 - 12t}{36 - 24t + 4t^2} = 0$; $\dfrac{10t^2 - 2t^3 - 6t}{18 - 12t + 2t^2} = 0$

$\dfrac{5t^2 - t^3 - 3t}{(3-t)^2} = 0$

$5t^2 - t^3 - 3t = 0$; $t \times (5t - t^2 - 3) = 0$

$t = 0$

$5t - t^2 - 3 = 0$

$t \approx 0$,