

20090211

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Important Example ~~testone~~ 2009 testone sample

(13.) $Q = 0.06x^2 + 0.15xy + 0.05y^2 = \text{constant} (2691)$

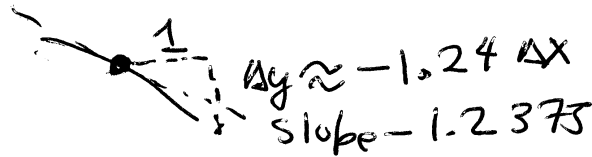
Evaluate $\frac{dy}{dx}$ when $x=60, y=150$

Diff both wrt x

$$0.12x + 0.15 \left[y + x \frac{dy}{dx} \right] + 0.10y \frac{dy}{dx} = 0$$

$$\left[0.15x + 0.10y \right] \frac{dy}{dx} = - \left(0.12x + 0.15y \right)$$

$$\frac{dy}{dx} = - \frac{0.12x + 0.15y}{0.15x + 0.10y} = -1.2375$$



CR NOS INC / DEC

Critical numbers $\equiv x$ s.t. $\frac{dy}{dx} = 0$

Intervals of INC / DEC fenced by [only] by
 { Critical Numbers
 { Special Points: ($\div 0$, etc)

Increasing at $x = x_0$: $\frac{dy}{dx} \Big|_{x=c} > 0$

#15 testone sample: INC/DEC for $x^2 + 5x - 3$

$$\frac{dy}{dx} = 2x + 5 \quad \text{CRNO. } x = -\frac{5}{2}$$

Vertex of Parabola at $x = -\frac{5}{2}$ (this case MINIMUM)

(N.B.) Parabola: $Ax^2 + Bx + C$ 20090111 2/

$$\frac{dy}{dx} = 2Ax + B, \frac{dy}{dx} = 0 \quad \boxed{x = \frac{-B}{2A}}$$

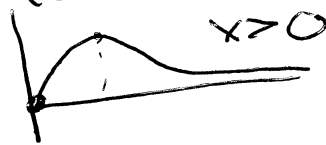
Max or Min according to sign A.

Critical Numbers of $\frac{x}{0.3x^2 + 8}$

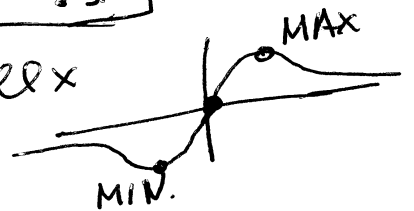
$$\frac{dy}{dx} = \frac{(0.3x^2 + 8) \cdot 1 - x(0.6x)}{(0.3x^2 + 8)^2}$$

$$= \frac{8 - 0.3x^2}{(0.3x^2 + 8)^2}, \quad \boxed{x = \pm \frac{8}{.3}}$$

Graph



All x



You may be asked to use the calculator methods you learned in SA1 to solve an equation like e.g. $x^3 - x + 2$

($\boxed{0}$) $\uparrow \uparrow$ $0 = y_1$; $\frac{-1}{x = \dots}$) Solve ^{Over}

(Solve) equation vars. $x = \dots$