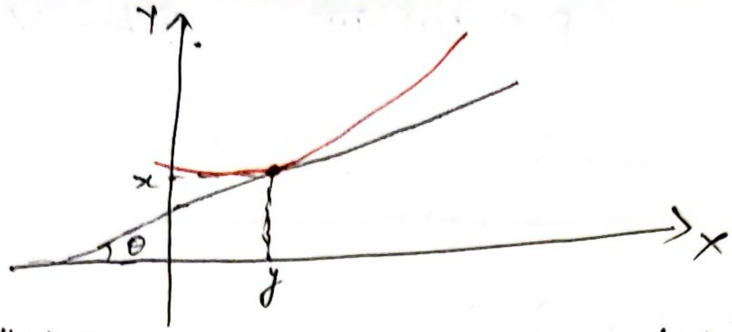

when $\Delta y \to 0$, $\Delta x \to 0$, line AB becomes tangent to the curve at Point A

$\Rightarrow$ $\tan\theta \to$ slope of tangent at A $(= m)$

or $\quad m = \lim\limits_{\Delta x \to 0} \frac{\Delta y}{\Delta x} = \lim\limits_{\Delta x \to 0} \frac{(y+\Delta y)-y}{\Delta x}$

$\lim\limits_{\Delta x \to 0} \frac{\Delta y}{\Delta x} \to$ derivative of y with respect to x

$\lim\limits_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$ is written as $\frac{dy}{dx}$.

Now for $y = f(x)$ and $y + \Delta y = f(x+\Delta x)$

$$\boxed{\frac{dy}{dx} = \frac{df(x)}{dx} = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} = \lim_{\Delta x \to 0} \left[\frac{f(x+\Delta x) - f(x)}{\Delta x}\right]}$$

H.W. (i) Obtain the derivatives of the trigonometric functions:

$\sin x, \cos x, \tan x, \cot x, \operatorname{cosec} x, \sec x$.

(ii) Hyperbolic functions $\quad \sinh x, \cosh x, \tanh x, \operatorname{sech} x, \operatorname{cosech} x, \coth x$

(iii) Plot the graph of above functions.

(iv) Draw the graph of $y = |x| + |x-1|$

(v) Examine the differentiability of the function

$f(x) = x^m \sin\left(\frac{1}{x}\right)$ when $x \neq 0$, $m > 0$

$f(x) = 0 \quad$, when $x = 0$,

at point $x=0$. Determine m when $f'(x)$ is continuous at the origin.