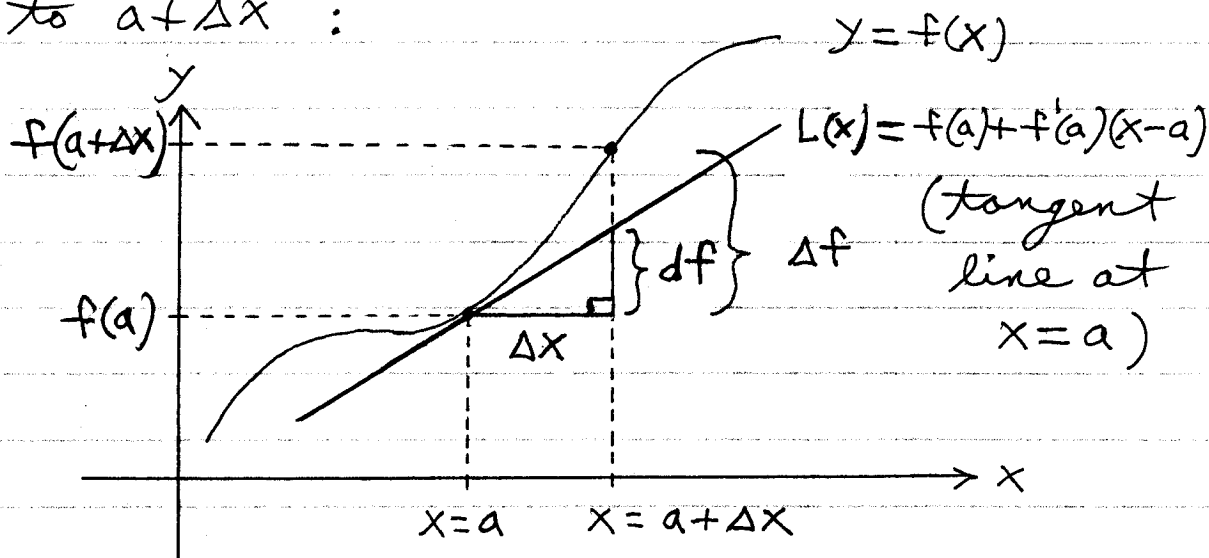


Math 17A

Kouba

The Differential of a Function

Consider the function $y = f(x)$ and its linearization $L(x) = f(a) + f'(a)(x-a)$ at $x = a$. Assume x changes from a to $a + \Delta x$:



Let Δx : change (error) in x
 Δf : change (error) in f
 df : differential of f ; then

$$\Delta f = f(a + \Delta x) - f(a) \quad \text{and}$$

SLOPE of line L is $\frac{\text{rise}}{\text{run}} = \frac{df}{\Delta x} = f'(a) \rightarrow$
differential of f is $df = f'(a) \cdot \Delta x$;

Note: If Δx is "small", then it can be shown that

$$df \approx \Delta f.$$