

Derivatives and Integrals in MathCad

(Dr. Tom Co 10/19/2008)

1. The menu for derivative and integral operations can be accessed by choosing **[View]→[Toolbar]→[Calculus]** as shown in Figure 1. (This menu is “dockable”)



Figure 1. Calculus menu bar.

- Note that there are two derivative operators: the first order derivative and the nth order derivative operators. (The hotkey are **[shift /]** and **[Ctrl shift /]**, respectively. The hotkey for the integral without limits is **[ctrl I]** and the hotkey for the integral with limits is **[Ctrl &]**).
2. One approach is to first define the function and then enter a separate function for the derivative or integral operation. Note that the derivatives are performing partial derivatives, i.e. if the function is multivariable, it assumes the other variables constant during evaluation).

Example:

$$f(x) := \left(\cos\left(\frac{x}{3}\right) \right) \cdot e^{-2x}$$

$$df(x) := \frac{d}{dx} f(x)$$

$$intf(a, x) := \int_a^x f(x) dx$$

$$intf(a, x) \rightarrow \left(\frac{-18}{37} \cdot \cos\left(\frac{1}{3} \cdot x\right) + \frac{3}{37} \cdot \sin\left(\frac{1}{3} \cdot x\right) \right) \cdot e^{(-2) \cdot x} + \left(\frac{18}{37} \cdot \cos\left(\frac{1}{3} \cdot a\right) - \frac{3}{37} \cdot \sin\left(\frac{1}{3} \cdot a\right) \right) \cdot e^{(-2) \cdot a}$$

(Recall that the live symbolic operator is set by the hotkey **[ctrl period]**.)

3. To use interactive symbolic, position the cursor on the desired variable and then select **[Symboics]→[Variable]→[Differentiate]** or **[Symboics]→[Variable]→[Integrate]**. However, in interactive symbolic mode, higher order derivatives have to be done repeatedly.

4. Once the derivative of integral function has been defined, numerical evaluation can be obtained as usual, i.e. other operations such as **root()** can be used.