

# Chapter 8

## Multiline Equations

Now let's put together some of the concepts we've learned to build the following equation:

paste\_14.eps ↯

After this, we'll introduce **Multiline** equations by modifying the equation to look like this:

paste\_15.eps ↯

**Evaluation limits**

In this first example, we have a new construction: the partial derivative evaluated at  $x_p$ . First, build everything up to the partial derivative. Then, build the partial derivative using the Operators & Calculus palette, and then add  $n_p$  to the numerator.

OperatorsCalculusButton.tiff  $\rightarrow$

In order to add the evaluation limit, select the *entire* partial derivative and hit the  $\partial$  character on the keyboard. This will place two bars on either side of the partial derivative. Since we do not want a bar on the left side, we'll need to change the left delimiter. To change the left delimiter from a bar to nothing, select the entire delimiter and bring up the Delimiter Inspector (**Command-3**).

Click the empty button at the top left of the **Style** column to turn off the left delimiter. (See Chapter 4 for an introduction to the Delimiter Inspector.)

Now that the Delimiter has a single bar on the right-hand side, we need to specify the evaluation limit. The easiest way to do this is to place a subscript on the *entire* delimiter. For that, select the partial derivative as well as the bar (if it isn't selected already), and either type  $\partial_{\phantom{x}}$  or click the subscript button on the Element Creator panel to place the cursor in the subscript position.

Fill out the  $\partial x_p$  and press return to signify you are done with the subscript. This completes the

first example.

## Multiline equations

Let's now assume that the first equation is a single step in some derivation. To show subsequent steps, one possibility would be to typeset them as completely different equations and insert them separately into our document or presentation.

Unfortunately, that would make it difficult to align the equations to a particular character (like the  $a=0$  in our second example), and it would also mean that we'd need to keep track of many more equations in our document or presentation.

For these reasons, EquationBuilder has its own Multiline element type which knows how to stack different expressions and align them to particular characters. For this example, select the entire expression you just completed and bring up the **Multilines & Matrices** palette.

MultilineMatricesButton.tiff ↵

Press the multiline button. (It's the one on the left-hand side of the panel labeled n-lines). This will place the selected equation on the first line of a three-line Multiline element.

Since the equation we want to build will only have two lines, select the entire Multiline

element and bring up the **Multiline Inspector**:

## MultilineInspector.tiff ↵

Change the number of lines from three to two and press OK.

- **Note**

Just as with matrices, if you decrease the number of lines in a Multiline element, anything you may have had in those bottom lines will be deleted once you press OK, so *use with caution!*

By default, all lines are aligned by their left sides.

Since we wish for the second line in our equation to be aligned to the  $a=0$  in the first line, select the  $a=0$  in the first line. Because *any* element could be chosen as the element we want to align something to, we need to bring up the Element Inspector which allows us to modify parameters that all elements potentially share.

## ElementInspector.Multiline.tiff ↵

At the very bottom of the Element Inspector, in the area that was previously empty, the **Multiline Element Alignment** box should now be visible. Press the Align Vertically on Selection switch, and the second line will align itself with respect to the  $a=^{\circ}$  sign, rather than to simply the left-hand side of the first line.

Now place the cursor in the second line and fill in the second line of the equation to complete this example.

• **Note**

Multiline elements can be used anywhere in an equation. See Ex06.eqn in the Gallery for an additional example of where Multiline elements may be useful.

## Variations

Suppose for some reason we wanted to typeset an equation of this form:

paste\_16.eps ↵

If we only do the same thing as we did in the previous example and select the  $a=^{\circ}$  in the first equation and then align vertically to it, the left side of the  $a e^{\circ}$  in the second line would be then aligned to the  $a=^{\circ}$  sign in the first line.

The trick here is to select the  $a_{>^0}$  in the second line and align vertically to it as well. That way, the left side of the  $a_{=^0}$  will align to the left side of the  $a_{>^0}$ , matching the example above.