#1: $$(x + a)^n$$

Typing the above expression into the entry line sets up the expression for Derive, which can then be entered (or 'authored') for Derive to manipulate using the return key. The 'tick' button to the left of the entry line has the same effect. Using the '=' button evaluates a highlighted expression. Use of the 'tick plus =' button both enters and evaluates an expression, while the 'approximate' and 'tick plus approximate' buttons behave similarly, but with approximate rather than exact evaluation.Where exact evaluations are not possible the latter 'approximate' may still produce results when the former does not.

A text box, such as the one in which these comments are being made, is created by selecting 'Text Object' from the Insert menu, and appears immediately after a highlighted derive expression.

It can be edited subsequently by just clicking back onto the text area, and the text box will automatically re-appear.

#2: $$\mathrm{TABLE}((x + a)^n, n, 0, 5, 1)$$

This sets up a table with the power n as the parameter, and specifies a range of values for n = 0 to 5.This is done by highlighting the first expression,#1, and using the Table command from the calculus menu.

#3: $$\begin{bmatrix} 0 & 1 \\ 1 & x + a \\ 2 & (x + a)^2 \\ 3 & (x + a)^3 \\ 4 & (x + a)^4 \\ 5 & (x + a)^5 \end{bmatrix}$$

The table, #3, can now be highlighted, and the Expand function applied from the Simplify menu.

#4: $$\begin{bmatrix} 0 & 1 \\ 1 & x + a \\ 2 & x^2 + 2 \cdot a \cdot x + a^2 \\ 3 & x^3 + 3 \cdot a \cdot x^2 + 3 \cdot a^2 \cdot x + a^3 \\ 4 & x^4 + 4 \cdot a \cdot x^3 + 6 \cdot a^2 \cdot x^2 + 4 \cdot a^3 \cdot x + a^4 \\ 5 & x^5 + 5 \cdot a \cdot x^4 + 10 \cdot a^2 \cdot x^3 + 10 \cdot a^3 \cdot x^2 + 5 \cdot a^4 \cdot x + a^5 \end{bmatrix}$$

This produces a table of binomial expansions.

#5: $f(x) := x^n$

This defines a function f(x), the symbol':=' is the function assignment symbol. The rule of f can now be used in subsequent work.

#6: $f(2)$

This is written in the entry line, and 'authored' then 'evaluated' automatically by selecting the 'tick and equals' option,as are each of the following expressions.

#7: $$2^n$$

#8: $f(2 + h)$

#9: $$(h + 2)^n$$

#10: $f(x + h)$

#11: $$(x + h)^n$$

#12: $$\frac{f(x + h) - f(x)}{h}$$

#13: $$\mathrm{TABLE}\left(\frac{f(x + h) - f(x)}{h}, n, 0, 5, 1\right)$$

#14: $$\begin{bmatrix} 0 & 0 \\ 1 & 1 \\ 2 & 2\cdot x + h \\ 3 & 3\cdot x^2 + 3\cdot h\cdot x + h^2 \\ 4 & 4\cdot x^3 + 6\cdot h\cdot x^2 + 4\cdot h^2\cdot x + h^3 \\ 5 & 5\cdot x^4 + 10\cdot h\cdot x^3 + 10\cdot h^2\cdot x^2 + 5\cdot h^3\cdot x + h^4 \end{bmatrix}$$

Using the 'Simplify' option from within the Table menu enables the algebraic pattern to be noted. This could be done in stages, for example, f(x+h), f(x+h)−f(x)then (f(x+h)−f(x))/h (with students doing the first few by hand in each case). This then provides the opportunity for the subsequent focus to be on exploring the limiting behaviour of these expressions as h tends to 0. We can, for example, apply the limit process as h tends to zero, to each of the elements ofthe preceding table:

#15: $$\lim_{h\to 0} \begin{bmatrix} 0 & 0 \\ 1 & 1 \\ 2 & 2\cdot x + h \\ 3 & 3\cdot x^2 + 3\cdot h\cdot x + h^2 \\ 4 & 4\cdot x^3 + 6\cdot h\cdot x^2 + 4\cdot h^2\cdot x + h^3 \\ 5 & 5\cdot x^4 + 10\cdot h\cdot x^3 + 10\cdot h^2\cdot x^2 + 5\cdot h^3\cdot x + h^4 \end{bmatrix}$$

#16: $$\begin{bmatrix} 0 & 0 \\ 1 & 1 \\ 2 & 2\cdot x \\ 3 & 3\cdot x^2 \\ 4 & 4\cdot x^3 \\ 5 & 5\cdot x^4 \end{bmatrix}$$

Such a treatment is typically preceding by numerical consideration at a suitable selection of points for a given function, for example, x^2.