Find the derivative with respect to x of the following functions. **Additionally, find the derivative with respect to a of function h.**

Provide your answers on this sheet. Where you took more than one step to arrive at the final result, please include the important steps. You may fill out the sheet by hand and submit a scanned version.

$f = 3x^2$

$g = (x+8)^2$

$h = ax^3 + \frac{1}{2}x^8$

$k = x^{501} + 3x^7 - \frac{1}{2}x^6 + x^5 + 2x^3 + 3x^2 - 1$

$\frac{df}{dx} = 6x$

$g = (x+8)^2 = x^2 + 16x + 64$

$\frac{dg}{dx} = 2x + 16$

$\frac{\partial h}{\partial x} = 3ax^2 + 4x^7$

$\frac{\partial h}{\partial a} = x^3$

$\frac{dk}{dx} = 501x^{500} + 21x^6 - 3x^5 + 5x^4 + 6x^2 + 6x$

Note the ∂ used in the derivative for the function h. $\frac{\partial h}{\partial x}$ and $\frac{\partial h}{\partial a}$ indicate these are the **partial derivative** to x and a respectively.

Description of the main function in the python code

1. The function that contains the main computation logic is called `derivative`. It takes a list of floats as input parameters called `input_function and` returns a new list called `result` that receives the results of the derivative calculations

2. Convention used for mapping the indices of the list to the "x power" of the function
    a. Element 0: x^0
    b. Element 1: x^1
    c. Element 2: x^2

3. The `derivative` function iterates over the elements of the list passed as parameter, keeping track of the index of the element being processed
    a. Starting at index 1, for each element of `input_function`, multiply the index of the element by its value and store in `result`