Problem 1 5 points
In the car problem, you evaluated $dM/dV_0$ and $dM/dk$ analytically. Now do this using finite differencing. For example

$$dM/dV_0 = (M(V_0 + dV_0, k) - M(V_0, k))/dV_0$$

where $dV_0=0.01*V_0$.

You don’t have to run your program to estimate $V_0$ and $k$ again, just write a small program to compute $dM/dV_0$ and $dM/dk$ by both methods for $dV_0$ and $dk$ ranging from 0.01 to machine eps in steps of 10, i.e., 0.01,0.001,0.0001 etc. Remember that $V_0$ and $k$ are non-dimensionalized.

Problem 2 5 points
Repeat Problem 1 using complex variables. Set $V_0+dV_0=$complex($V_0,dV_0$), $k+dk=$complex($k,dk$) and compare the values of $dM/dV_0=\text{imag}(M(V_0+dV_0))/dV_0$ and similarly for $dM/dk$. 