Assignment 3

An undersaturated oil reservoir material balance simulator computes the cumulative oil produced from a block, in a discretized model, thus:

$$N_p = \frac{NB_{oi}c_e(P_i - P_{now})}{B_o} - - - - - - - - P5$$

- N_p is the cumulative oil produced from a given block.
- B_{oi} is the initial oil formation volume factor (assumed constant for all blocks)
- c_e is the effective compressibility (assumed constant for all blocks)
- P_i is the initial reservoir pressure (assumed constant for all blocks)
- P_{now} is the current reservoir pressure (varies across blocks depending on proximity to producer well)
- B_o is the current value of the oil formation volume factor (depends on current pressure in a block)

Below is the expression to calculate the B_o value corresponding to a given current pressure.

$$B_o = B_{ob}[1 - c_o(P_{now} - P_b)] - - - - - - - - - - P6$$

Given a set of parameter (N_p, B_{oi}, B_{ob}, c_e, c_o and P_i) values and a grid of current pressure values, write a Python script to implement Equations P5 and P6 for each block. Also include statements to sum up and present the total cumulative oil produced from the entire reservoir.

Save the script as *mat_bal.py*, commit and push it to your GitHub repository. Submit the URL to your copy of *PET328_2021_Class* repository. Furthermore, send a pull request to the original *TTOWG/ PET328_2021_Class* repository.