

**Question 1.****(100 pts)**

Code in Matlab DCOPF with flexible demand using modified Matpower case (MPC) format. MPC format allows for a single fixed load connected to a bus so you will need to add an additional matrix describing the flexible load utility functions similar to generation cost functions matrix. You should allow for quadratic demand utility and generation cost functions so you must use quadprog() optimization function from Matlab or OPTI toolbox that you can download from the internet. Remember that a quadratic generator cost function must be strictly increasing between the generator output limits and the demand utility function must be strictly decreasing between its limits. MPC can define multiple generators on a bus but a single load. Although it is trivial to allow for multiple loads connected to a bus, because of MPC format limitations you can assume a single load connected to a bus. Note that there might be buses with no load or generators or with a single or multiple generators and a single load. This might look complicated and confusing but it is straight forward to code.

You should submit your solution through Canvas only and it should contain well commented code and test cases to demonstrate the functionality. Make sure that your solution is reproducible and with instructions how to run it to receive full credit.