This is a very difficult project. I suggest you get started early and make sure you understand today's lecture well. (As always, the recording of today's lecture will be posted.) I will also meet with you individually if you email to ask. My schedule tends to fill up close to the deadline, so please ask soon. There will be no extensions for this project except in case of medical reasons or similar. This is because otherwise I will not be able to submit grades by the university deadline. This will be worth the final 16 of the 28 project points. There will also be an easier extra credit part that will be counted separately.

Your goal is to minimally yet fully implement the DNS protocol for a full resolver. The server is not allowed to use gethostbyname or any similar function; to be clear, **any function designed to work with DNS is not allowed**. However, in order to test and figure out what to do, I suggest you start by using those functions as training wheels which you can take off for the final project. **Your server is also NOT ALLOWED to make recursive queries and must find the address iteratively.**

Your server must fully implement the protocol as explained in these two documents:
https://tools.ietf.org/html/rfc1034 (all relevant but see especially **5.3**)
https://tools.ietf.org/html/rfc1035

There are a few further clarifications in the following documents:
https://tools.ietf.org/html/rfc1123 (6.1 ONLY. Note you are implementing a full resolver)
https://tools.ietf.org/html/rfc2181
https://tools.ietf.org/html/rfc2308
https://tools.ietf.org/html/rfc2672
https://tools.ietf.org/html/rfc3597 (This one is only for the extra credit)
https://tools.ietf.org/html/rfc5452 (9.2 and 3)
https://tools.ietf.org/html/rfc7766 (I have already dealt with this one for you in the given code)
https://tools.ietf.org/html/rfc6891#section-7 (We are NOT implementing this one, just look at section 7 for how to indicate that)

NOTE: Unlike other projects, due to this one's difficulty you can receive full credit even with a number of mistakes. If the above documents are too intimidating, just ignore them and make sure that you get the first two correct.

I recommend that you test your project using the dig linux program as I will show you in class; you can also test it using the previous project.

Any code that is copied from anywhere without citation will be considered a violation of the academic integrity policy and dealt with appropriately. The only exception is that you may copy snippets from the Python API without citation.

How we will test your programs

As part of your submission, you will turn in one program (my_server.py) and one README file (more on this below). We will be running the two programs on the ilab machines with Python 3.6. **Note that you must use Python 3 for this to work since threading is quite different. Python 2 will not work with my code.**

Program

Please do not assume that all programs will run on the same machine or that all connections are made to the local host. We reserve the right to test your programs with local and remote socket connections, for example by running dig on a different machine than your DNS resolver. You are welcome to simplify the initial development and debugging of your project, and get off the ground by running all programs on one machine first. However, you must eventually ensure that the programs can work across multiple machines.

The program must work with the following command line:
python3 Server.py PORT

An example of this would be:
python3 Server.py 5444

I will then submit a number of requests through dig for both major and minor domain names to see if your program responds correctly. I may also look into the details of the code for more obscure cases which are harder to test.

README file

In addition to your program, you must also submit a README file with clearly delineated sections for the following:

0. Please write down the full names and netids of both your team members.

1. What are the known issues or functions that aren't working currently in your attached code? **Note that you will get half credit for any reasonably sized bug that is fully explained in the README and - for this project only - full credit for smaller bugs whose solution is explicitly described. If you do not give any known issues, I will expect everything to function perfectly, and you will lose points if it does not.**

2. What problems did you face in developing code for this project? Around how long did you spend on this project? (This helps us decide what we need to explain more clearly in future iterations of the course.)

<u>Submission</u>

Turn in your project on Sakai assignments. **Only one team member should submit the team's project.** Please DO NOT ZIP your files. You must submit both my_server.py and README.