You will need to run two AVDs in order to test your app. Unfortunately, Android does not provide a flexible networking environment for AVDs, so there are some hurdles to jump over in order to set up the right environment. The following are the instructions.

* You need to have the Android SDK and Python 2.x (not 3.x; Python 3.x versions are not compatible with the scripts provided.) installed on your machine. If you have not installed these, please do it first and proceed to the next step.
* Add <your Android SDK directory>/tools to your $PATH so you can run Android’s development tools anywhere.
  + A good reference on how to change $PATH is [here](http://www.java.com/en/download/help/path.xml).
* Add <your Android SDK directory>/platform-tools to your $PATH so you can run Android’s platform tools anywhere.
* Download and save [create\_avd.py](http://www.cse.buffalo.edu/~stevko/courses/cse486/spring17/files/create_avd.py), [run\_avd.py](http://www.cse.buffalo.edu/~stevko/courses/cse486/spring17/files/run_avd.py), and [set\_redir.py](http://www.cse.buffalo.edu/~stevko/courses/cse486/spring17/files/set_redir.py).
* To create AVDs, enter: python create\_avd.py 5 <your Android SDK directory>
  + The above command should be executed only once because you do not need to create AVDs multiple times.
  + In the middle of the script, it will ask “Do you wish to create a custom hardware profile [no]” multiple times. The script handles it automatically, so please do not enter anything to answer that question.
  + 5 AVDs should have been created by the above command. The names are avd0, avd1, avd2, avd3, & avd4. You can manipulate them in Android Studio, but please do not edit or delete them because they are necessary for our scripts to work.
  + If you can’t create x86-based AVDs, please enter: python create\_avd.py -a arm 5 <your Android SDK directory> instead; this will create ARM-based AVDs. However, we strongly encourage you to not do this, but to create x86 AVDs.
* For all the programming assignments except this first one, you will need to run 5 AVDs at the same time. This means that you need to have access to a machine that can handle 5 AVDs running simultaneously.
* In order to test the above, please enter: python run\_avd.py 5
  + The above command will launch 5 AVDs.
  + Please play around with all 5 AVDs and make sure that your machine can handle them comfortably. Most of the recent laptops will run 5 AVDs without much difficulty.
  + After you are done checking, close all AVDs.
* After all AVDs finish launching, create a network that connects the AVDs by entering: python set\_redir.py 10000
  + The above command will set up port redirections, but there are some restrictions in terms of socket programming. We will detail the restrictions in Step 3 below.