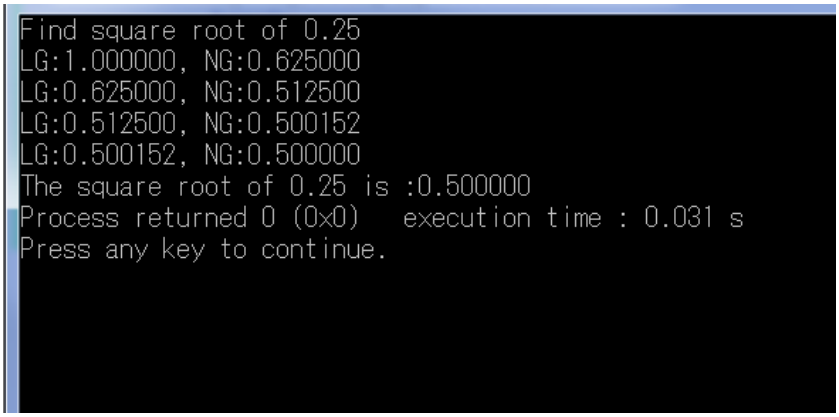
Homework #4

1. The square root of a number ***N*** can be approximated by repeated calculation using the formula

$$NG=0.5(LG+N/LG)$$

where ***NG*** stands for next guess and ***LG*** stands for last guess. Write a function that calculates the square root of a number using this method. The initial guess will be the starting value of LG. The program will compute a value for NG using the formula given. The difference between NG and LG is checked to see whether these two guesses are almost identical. If they are, NG is accepted as the square root; otherwise, the new guess (NG) becomes the last guess (LG) and the process is repeated (another value is computed for NG, the difference is checked and, so on). The loop should be repeated until the difference is less than 0.005. Use an initial guess of 1.0.

Write a driver function and test your square root function for the numbers 4, 120.5, 88, 36.01, 10,000, and 0.25. And show the value of *LG* and *NG* in each repetition as following example.



2. When an aircraft or an automobile is moving through the atmosphere, it must overcome a force called ***drag*** that works against the motion of the vehicle. The drag force can be expressed as

$$F=1/2*CD*A*p*V^2$$

where F is the force (in newtons), *CD* is the drag coefficient, *A* is the projected area of the vehicle perpendicular to the velocity vector (in m^2), *p* is the density of the gas or fluid through which the body is traveling (kg/m^3), and *V* is the body's velocity. The drag coefficient *CD* has a complex derivation and is frequently an empirical quantity. Sometimes the drag coefficient has its own dependencies on velocities: For an automobile, the range is from approximately 0.2 (for a very streamlined vehicle) through about 0.5. For simplicity, assume a streamlined passenger vehicle is moving

through air at sea level (where p=1.23 kg/m^3). Write a program that allows a user to input A and CD interactively and calls a function to compute and return the drag force. Your Program should call the drag force function repeatedly and display and table showing the drag force for the input shape for a range of velocities from 0 m/s to 40m/s in increments of 5m/s.