

Project Report

**CSE225**

**Section-3**

Submitted by:

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Problem statement:

A space shuttle lift- off from the launch pad has four forces acting on it

Given that,

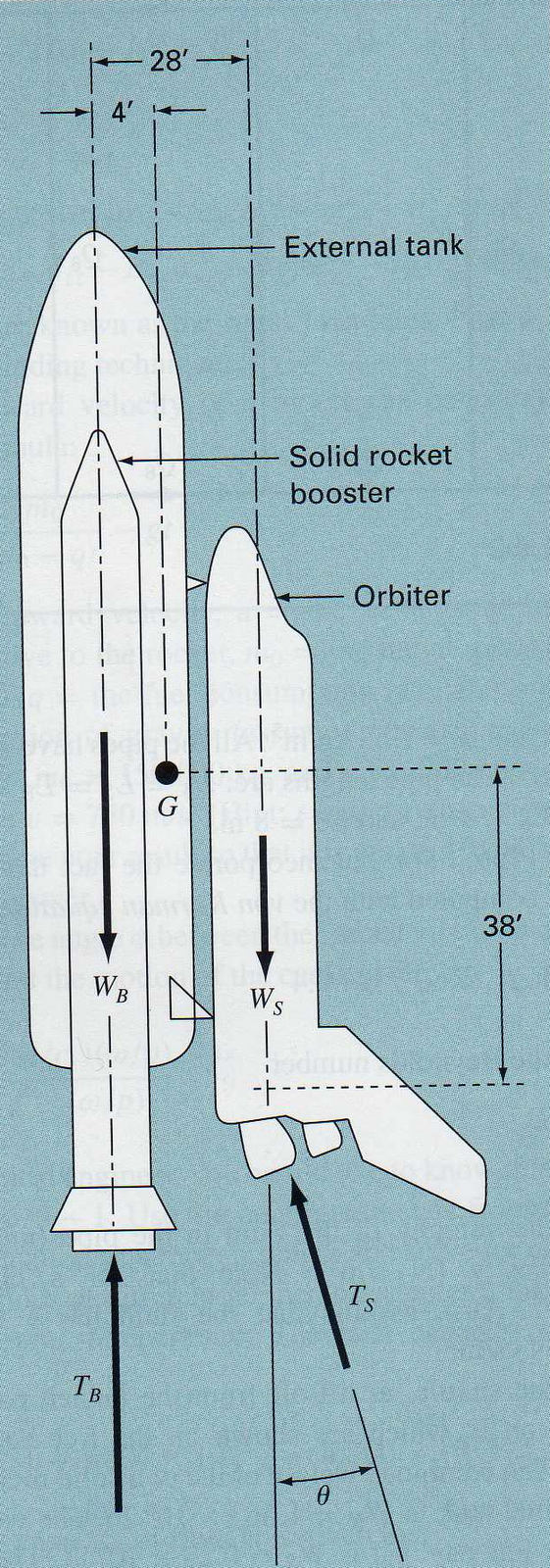
WB = 1.663 x 106lb

WS = 0.233 x 106lb

TB = 5.30 x 106lb

TS = 1.125 x 106lb

The resultant momentum acting on the craft is equal to zero, when Ө is adjusted to the proper value. The craft will not rotate about its mass center G at liftoff.



1. The horizontal and vertical components of the orbiter thruster can be computed as,

FH=TSsin𝜃, FV=TScos𝜃

A moment balance about point G can be computed as,

M=4WB-4Ws+24Ws+24Tscos𝜃-38Tssinθ

Here, WB=1.663\*10^6lb, Ws=.23\*10^6lb, TB=5.30\*10^6,

Ts=1.125\*10^6lb

Substituting the parameter values yields

M=-20.068\*106+27\*106cosθ-42.75\*106sinθ

Now,

0= -20.068\*106+27\*106cosθ-42.75\*106sinθ

Or, 20.068\*106-27\*106cosθ+42.75\*106sinθ=0

Or, 20.068+42.75sinθ=27cosθ

Or, sinθ+.4694=12/10 cosθ

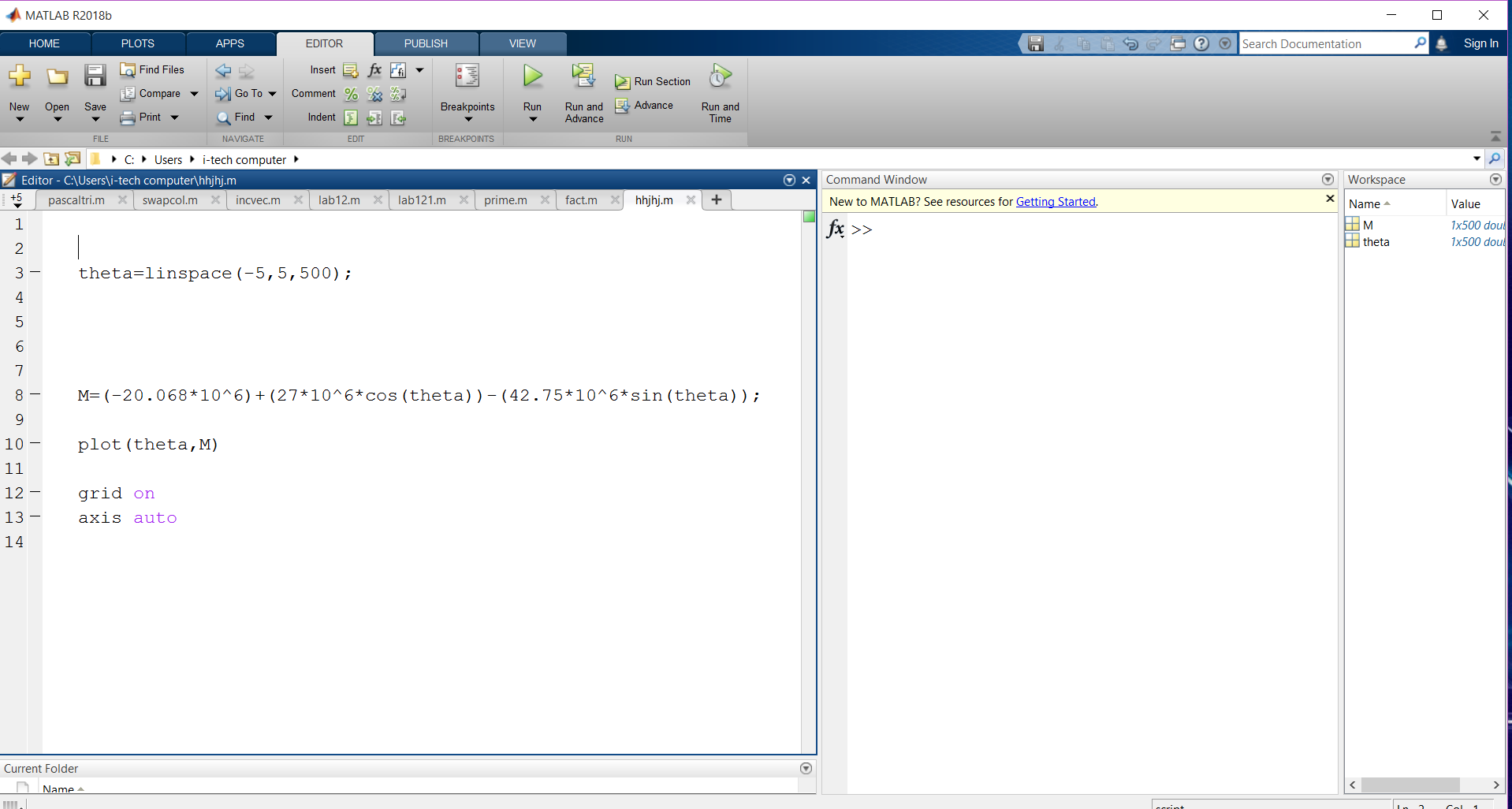
Or, sin2θ+0.9388sinθ+0.22033=0.39889cos2θ

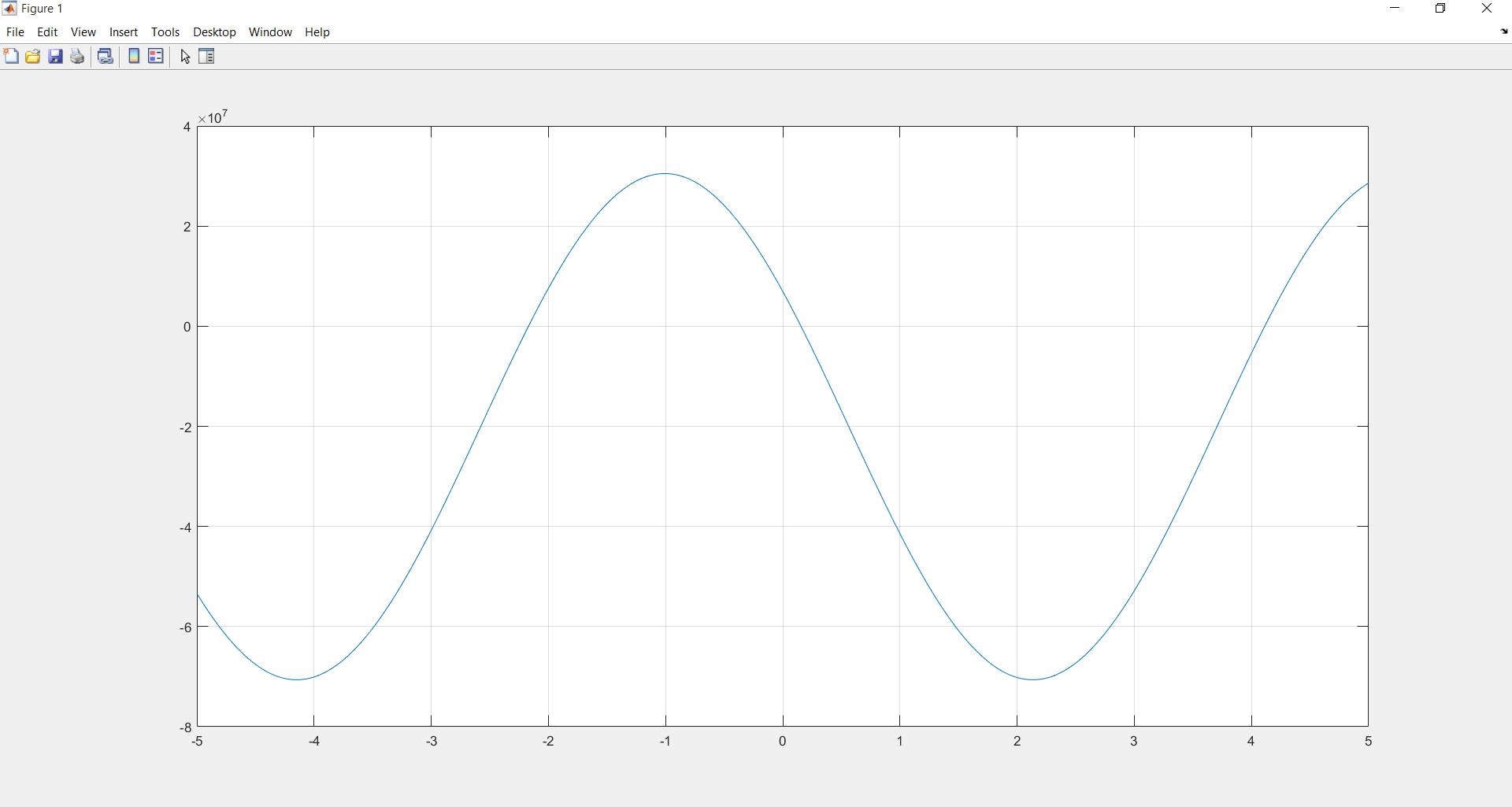
Or, 1.39889sin2θ+0.9388sinθ-0.17856=0

Or, θ=0.15459 degree

∴ θ=8.892877938rad (in radian)

(b)





A valid root occurs at about 0.15 radians.

Given range of the angle is -5 to +5 radians.

When, x = -5 then

x = -4 then

x = - 3 then

x = - 2 then

x = - 1 then

x = 0 then

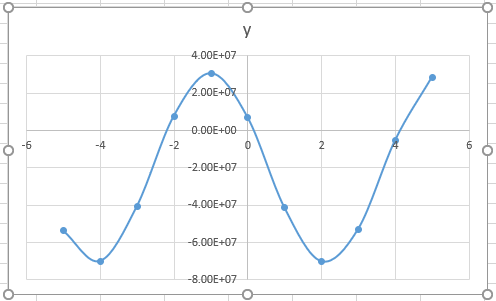
x = 1 then

x = 2 then

x = 3 then

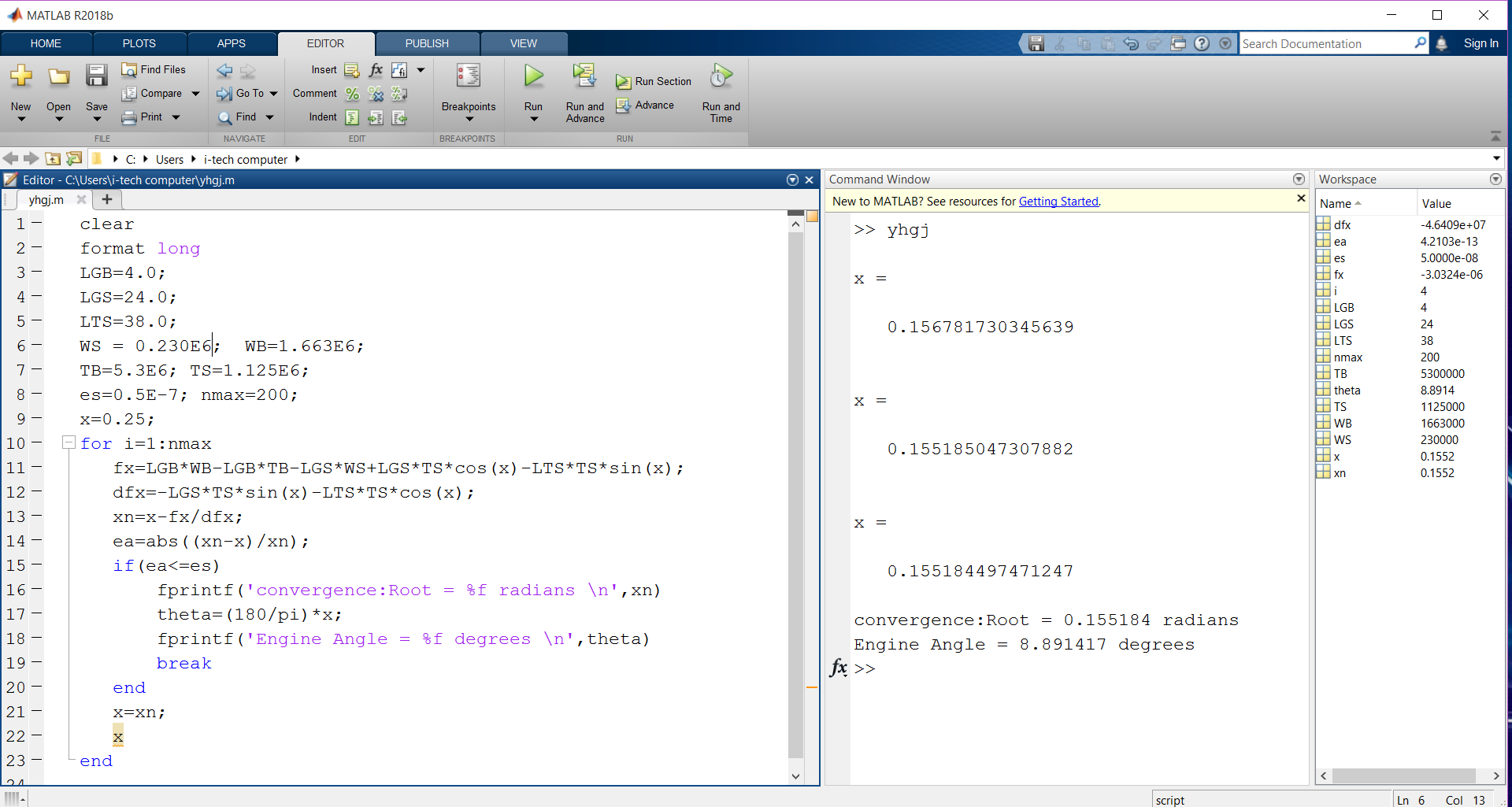
x = 4 then

x = 5 then

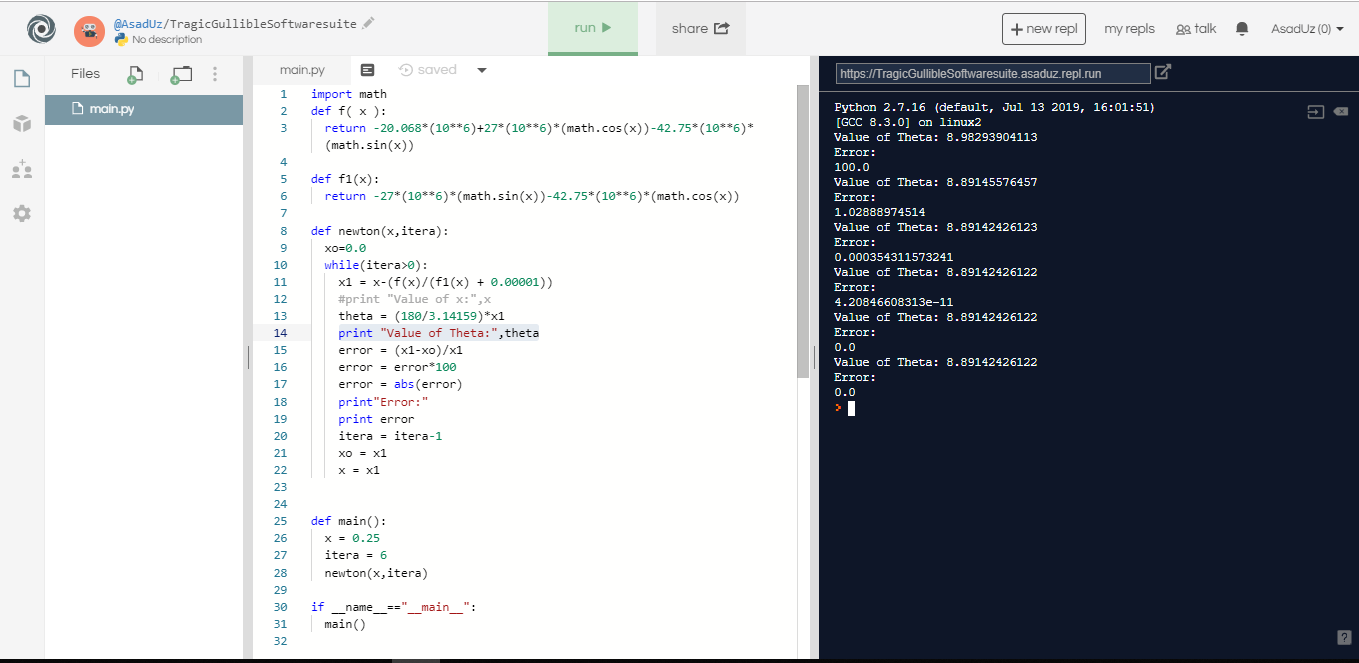


(c)

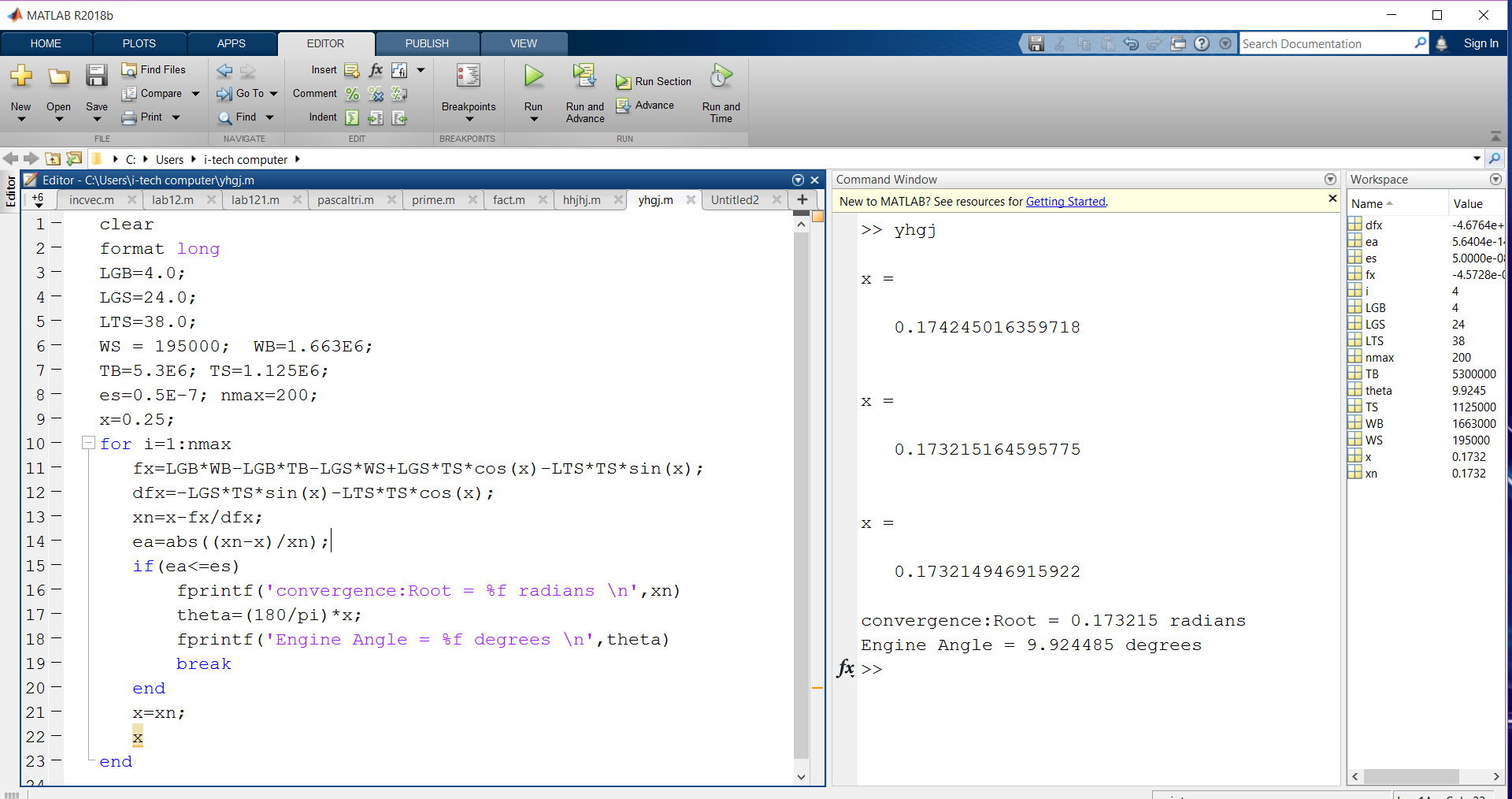
MATLAB source code and output:



Python 2.7 source code and output:



(d)

MATLAB source code and output:

Python 2.7 source code and output:

