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### ENG 382 ASSIGNMENT 1 SOLUTION

Command window

clear

clc

format short

$$V = 0.5$$

$$m = 3.5$$

$$q = 9.8$$

$$F = m * q$$

$$V = \text{sqrt}(\left(\left(F + (0.02 * V)\right) * (\log(V) ^ 3)\right) + (10 * V) + 17150) / 0.3);$$

for i = 1:inf

$$\text{iter}(i+1) = i$$

$$V(i+1) = \text{sqrt}(\left(\left(F + (0.02 * V(i))\right) * (\log(V(i)) ^ 3)\right) + (10 * V(i)) + 17150) / 0.3);$$

$$Ea(i+1) = \text{abs}(\left(\left(V(i+1) - V(i)\right) / V(i+1)\right) * 100);$$

if  $Ea(i+1) <= 1E-11$

break

end

end

table = table('iter', 'V', 'Ea')

### Output

iter	V	Ea
0	0.5	0
1	239.05	99.791
2	294.17	18.736
3	302.61	2.7894
4	303.85	0.40992
5	304.04	0.060144

6	304.06	0.0088222
7	304.07	0.0012941
8	304.07	0.00018981
9	304.07	$2.7842 e^{-05}$
10	304.07	$4.6838 e^{-06}$
11	304.07	$8.7865 e^{-08}$
12	304.07	$1.2888 e^{-08}$
13	304.07	$1.8904 e^{-09}$
14	304.07	$2.7727 e^{-10}$
15	304.07	$4.0679 e^{-11}$
16	304.07	$5.9635 e^{-12}$

Converging at iter = 7 ;  $\gamma = 304.07$

Prove:

$$F_D = \frac{0.3V^2}{500 + (\ln V)^3} \quad (0.02V)$$

If  $\gamma = 304.07$

Recall  $F_D = 9.8 \times 3.5 = 34.30$

Substituting  $\gamma = 304.07$

$$F_D = \frac{0.3 \times (304.07)^2}{500 + (\ln(304.07))^3} = 0.02(304.07)$$

$$F_D = 40.38195931 - 600814$$

$$F_D = 34.3$$