

ENG 382 ASSIGNMENT 1 SOLUTION

Command window

clear

clc

format short

V=0.5

m=3.5

q=9.8

f=m*q

$$V = \text{sqrt}(((C * f + (0.02 * v)) * (\log(v) \wedge 3)) + (10 * v) + 17150) / 0.3);$$

for i=1:inf

iter(i+1)=i

$$V(i+1) = \text{sqrt}(((C * f + (0.02 * V(i))) * (\log(V(i))) \wedge 3) + (10 * V(i)) + 17150) / 0.3);$$

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

if Ea(i+1) <= 1e-11

break

end

end

table = table(iter; V; Ea')

OUTPUT

iter	V	Ea
0	0.5	0
1	299.05	99.791
2	294.17	18.736
3	302.61	2.7894
4	303.85	0.40992
5	304.04	0.060444

6	304.06	0.0088222
7	304.07	0.0012941
8	304.07	0.00018981
9	304.07	2.7842e-05
10	304.07	4.0838e-06
11	304.07	8.7865e-08
12	304.07	1.2888e-08
13	304.07	1.8904e-09
14	304.07	2.7727e-10
15	304.07	4.0679e-11
16	304.07	5.9635e-12

Converging at $160r=7$, $v=304.07$

prove

$$f_D = 0.3v^2 - 0.02v$$

$$500 + (\ln v)^3$$

$$\text{If } v = 304.07$$

$$\text{Recall } f_D = 9.8 \times 3.5 = 34.30$$

Substituting $v = 304.07$

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

$$f_D = 40.38195931 - 660814$$

$$f_D = 34.3$$