

Command Window

clear

clc

Format short

$$V = 0.5$$

$$m = 3.5$$

$$q = 9.8$$

$$F = m * q$$

$$V = \text{sqrt}(\left(\left(F + (0.02 * V)\right)^{\left(\log(V)^3\right)} + (10 * V) + 17550\right) / 0.3);$$

for i = 1 : int

iter(i+1) = i

$$V(i+1) = \text{sqrt}(\left(\left(F + (0.02 * V(i))\right)^{\left(\log(V(i))^3\right)} + (10 * V(i)) + 17550\right) / 0.3);$$

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

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

break

end

end

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

Output

Iter	V	Eq
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	2.7842e ⁻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 Iter = 7; V = 304.07
 Prove

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

If $V = 304.07$

Recall $F_D = 9.8 \times 3.5 = 34.30$

Substituting $V = 304.07$

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

$$F_D = 40.38195931 - 660814$$

$$F_D = \underline{\underline{34.3}}$$