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# Assignment One

Command window

clear

clc

format short

$$V = 0.5$$

$$m = 3.5$$

$$g = 9.8$$

$$F = m * g$$

$$V = \text{Sqrt} \left( \frac{(F + (0.02 * V)) * (\log(V) * 3) + (10 * V) + 171.50 / 0.3}{103} \right);$$

F = i = 1: 10

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

$$V(i+1) = \text{Sqrt} \left( \frac{(F + (0.02 * V(i))) * (\log(V(i)) * 3) + (10 * V(i)) + 171.5}{103} \right)$$

$$E_n(i+1) = \text{abs} \left( \frac{(V(i+1) - V(i))}{(V(i+1) * 100)} \right)$$

if  $E_n(i+1) < 1E-11$

break

end

end

end

table = table('iter', 'V', 'E\_n')

Output

iter	V	E_n
0	0.5	0
1	239.05	97.791
2	294.17	18.736
3	302.61	2.7894
4	305.35	0.90992
5	307.04	0.06044

6	304.06	0.0088222
7	304.07	0.012941
8	304.07	0.00018981
9	304.07	$1.7842 \times 10^{-5}$
10	304.07	$4.0833 \times 10^{-6}$
11	304.07	$8.7065 \times 10^{-8}$
12	304.07	$1.2888 \times 10^{-8}$
13	304.07	$1.8904 \times 10^{-8}$
14	304.07	$2.727 \times 10^{-10}$
15	304.07	$4.0679 \times 10^{-11}$
16	304.07	$5.9655 \times 10^{-12}$

Converging at iter 7;  $V = 304.07$

Proof

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

If  $V = 304.07$

Recall  $E_A = 9.8 \times 3.9 = 34.70$

Substituting  $V = 304.07$

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

$$= 40.38195931 - 6008.4$$

$$F_A = 34.3$$