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1711ENGCS034

Mechatronics Engineering

ENG-352

ASSIGNMENT 1

Solution

```
Command window
```

```
clear
```

```
clc
```

```
format short
```

```
V = 0.5
```

```
m = 3.5
```

```
g = 9.8
```

```
Fc = m * g
```

```
V = sqrt((Cc * Fc + (0.02 * V) * (C * log(V/0.1)^3)) + (C * V) + 17150) / 0.3;
```

```
for p = 1:Inf
```

```
iter(i+1) = ?
```

```
V(i+1) = sqrt((Cc * Fc + (0.02 * V(i)) * (C * log(V(i)/0.1)^3) + (C * V(i)) + 17150) / 0.3;
```

```
Ea(i+1) = abs((C * 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	239.05	97.791
2	294.17	18.736
3	302.61	2.7894
4	303.85	0.40992

5	304.04	0.000144
6	304.06	0.000864
7	304.07	0.001296
8	304.07	0.00018981
9	304.07	2.7812e-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, $V = 304.07$

Proof

$$F_A = \frac{0.3V^2}{500 + (10V)^3}$$

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

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

$$\text{Substituting } V = 304.07$$

$$F_A = \frac{0.3 \times (304.07)^2}{500 + (10(304.07))^3} = 0.02(304.07)$$

$$F_A = 40.38195931 - 600814$$

$$F_A = 34.3$$