

DOUMU TARIERE JESSICA

CHEMICAL ENGINEERING

17/ENG01/029

NOYMU TARIERE JESSICA

17/ENG201034

CHEMICAL ENG

EN9384 - ASSIGNMENT 1

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

$$F_b = m + g$$

$$m = 3.5$$

$$g = 9.8$$

$$F_b = 3.5 \times 9.8 = 34.3$$

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

$$34.3 = \frac{0.3V^2}{500 + (\ln V)^3} - 0.02V$$

$$34.3 = \frac{0.3V^2 - (500 + (\ln V)^3)(0.02V)}{500 + (\ln V)^3}$$

$$17150 + (34.3(\ln V)^3) = 0.3V^2 - (10V + 0.02V(\ln V)^3)$$

$$17150 + (34.3(\ln V)^3) = 0.3V^2 - 10V - 0.02V(\ln V)^3$$

$$17150 + 34.3(\ln V)^3 + 10V + 0.02V(\ln V)^3 = 0.3V^2$$

$$V^2 = \frac{17150 + 34.3(\ln V)^3 + 10V + 0.02V(\ln V)^3}{0.3}$$

$$V^2 = 57166.67 + 114.33(\ln V)^3 + 33.33V + 0.0667V(\ln V)^3$$

$$V_{i+1} = \sqrt{(57166.67 + 114.33(\ln V_i) + 33.33V + 0.0667V(\ln V)^3)}$$

To Prove

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

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

$$F_b = 9.8 \times 3.5 = 34.3N$$

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

$$F_b = 34.3$$

Code on matlab:

```
commandwindow
clear
clc
format short g
syms v
v=0.5
for i=1:inf
    iter(i+1)=i
    v(i+1)=sqrt((34.4+0.02*v(i))*(500+(log(v(i))^3))/0.3);
    Ea(i+1)=abs((v(i+1)-v(i))/v(i+1))*100;
    if Ea(i+1)<=1E-11
        break
    end
end
iter'
v'
Ea'
table(iter',v',Ea')
```

Output:

v =

0.5

Warning: Too many FOR loop iterations. Stopping after 9223372036854775806 iterations.

> In Untitled22 (line 7)

iter =

0 1

iter =

0 1 2

iter =

0 1 2 3

iter =

0 1 2 3 4

iter =

0 1 2 3 4 5

iter =

0 1 2 3 4 5 6

iter =

0 1 2 3 4 5 6 7

iter =

0 1 2 3 4 5 6 7 8

iter =

0 1 2 3 4 5 6 7 8 9

iter =

0 1 2 3 4 5 6 7 8 9 10

iter =

0 1 2 3 4 5 6 7 8 9 10 11

iter =

0 1 2 3 4 5 6 7 8 9 10 11 12

iter =

0 1 2 3 4 5 6 7 8 9 10 11 12 13

iter =

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

iter =

Columns 1 through 15

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Column 16

15

iter =

Columns 1 through 15

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Columns 16 through 17

15 16

iter =

Columns 1 through 15

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Columns 16 through 18

15 16 17

ans =

0

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

ans =

0.5

239.4

294.6

303.05

304.29

304.48

304.5

304.51

304.51

304.51

304.51

304.51

304.51

304.51

304.51

304.51

304.51

304.51

ans =

0

99.791

18.737

2.7883

0.40956

0.060061

0.0088058

0.001291

0.00018927

2.7749e-05

4.0682e-06

5.9644e-07

8.7442e-08

1.282e-08

1.8795e-09

2.7555e-10

4.0396e-11

5.9362e-12

ans =

18×3 table

Var1	Var2	Var3
0	0.5	0
1	239.4	99.791
2	294.6	18.737
3	303.05	2.7883
4	304.29	0.40956
5	304.48	0.060061
6	304.5	0.0088058
7	304.51	0.001291
8	304.51	0.00018927
9	304.51	2.7749e-05
10	304.51	4.0682e-06
11	304.51	5.9644e-07
12	304.51	8.7442e-08
13	304.51	1.282e-08
14	304.51	1.8795e-09
15	304.51	2.7555e-10
16	304.51	4.0396e-11
17	304.51	5.9362e-12