Mardi Mark Chyozu
Mechatronics Engineering
16/ENG05/1023
Engineering Mathematics

Assignment 1

$$F_D = \frac{0.3V^2}{500 + (\ln V)^3} - 0.02V \quad \text{——— (1)}$$

$F_D = mg = 35 \times 9.8 = 34.4$ ——— (2)

Equating (1) and (2)

$$mg = 34.4 = \frac{0.3V^2}{500 + (\ln V)^3} - 0.02V$$

Making V^2 subject of the equation

$$34.4 + 0.02V = \frac{0.3V^2}{500 + (\ln V)^3}$$

$$0.3V^2 = (34.4 + 0.02V) \times (500 + (\ln V)^3)$$

$$V^2 = ((34.4 + 0.02V) \times (500 + (\ln V)^3)) / 0.3$$

$$V = (((34.4 + 0.02V) \times (500 + (\ln V)^3)) / 0.3)^{0.5}$$

from the equation

$V_0 = 0.5 m/s$

Absolute percentage relative error, $E_a(i+1) \leq 1E-11$

MATLAB CODE SOLUTION

```
1. command window
2. Clear
3. clc
4. close all
5. format short g
6. syms V
7. V = 0.5
8. For i = 1:inf
9.     iter(i+1) = i;
10.    V(i+1) = (((34.4 + (0.02 * V(i))) * (500 + (log(V(i)))
11.        /3))^0.5;
```

```
Es(i+1) = abs((V(i+1) - V(i)) / V(i+1)) * 100;
if Es(i+1) <= 1E-11
    break
  end
end
table = [iter' v' Es']
```

The estimated terminal velocity v 252.86 m/s