Itseoritse Metseaghanim 17/ENG06/078
MECHANICAL ENGINEERING
ENG 382

ASSIGNMENT 1

$F = \frac{0.3v^2}{500+(\ln v)^2} - 0.02v$ ——— (1)

$F_0 = Mg = 3.5 \times 9.8 = 34.3$ ——— (2)

Equating eqn 1 & (2)

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

Making v the subject of formula

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

$0.3v^2 = (34.3 + 0.02v) * (500 + (\ln v^2))$

$v^2 = \frac{(34.3 + 0.02v) * (500 + \ln v^2))}{0.3}$

$v^2 = \sqrt{\frac{(34.3 + 0.02v) * (500 + (\ln v)^2)}{0.3}}$

Initial guess value = v_0 = 0.5m/s

Absolute % ratio error $\varepsilon_a(T+1) < 1E-11$

MatLAB.

Command Window

```
Clear
Clc
Close all
syms v
v= 0.5
T= 1 ; Int
(T+1)= T
v(T+1) = [(34.3+0.002 * v(:))]* 500 +(log(v(:))) ^3/0.3 ^ 0.3
Ea(T+1) = abs((v(T+1) - v(T))/v(T+1) * log 100,
    If Ea(T+1) <= 1E-11
  break
   end
```

Table = [Iter v' ε_a]

Hence, the estimated terminal velocity is 304.07 m/s

substituting in eqn = $f_1 = 34.3$