

Ajase Boluwatife Agomide

Civil Engineering

17/ENR 03/008

Question 1

1a) Command Window

CIC

close all

Syms n(t)

D = diff(n)

$$\text{ode} = (\text{diff}(n, t, 2)) - (\text{diff}(n, t)) - (12 * n) == 144 * t^3 + 12.5;$$

$$\text{Cond 1} = D(0) == -0.5;$$

$$\text{Cond 2} = n(0) == 5;$$

$$\text{conds} = [\text{Cond 1}, \text{Cond 2}];$$

$$\text{dsol}(t) = \text{dsolve}(\text{ode}, \text{conds});$$

$$\text{dsol} = \text{simplify}(\text{dsol}(t))$$

$$\text{tn} = [0:0.1:1.5];$$

$$\text{Sols} = \text{subs}(\text{dsol}, \text{tn})$$

plot(tn, Sols)

grid on

legend('Sols', 'Location', 'best')

4b.) Command window

close all

clear

clc

Syms y x t

ode1 = diff(y,t) - 2*x == exp(-2t);

ode2 = diff(x,t) + y == exp(-t);

odes = (ode1, ode2);

ysol = dsolve(odes)

Cond1 = (x2 == 0)

Cond2 = (y == 0)

conds = (Cond1, Cond2)

ysol = dsolve(odes, conds)

(x_solt, y_solt) = dsolve(ode, conds)

x_solt(t) = x_solt

y_solt(t) = y_solt

(ii) Visualizing the solution on graph separately
f plot (xsolt)
f plot (ysolt)
grid on
Legend ('xsolt', 'Location', 'best')
Legend ('ysolt', 'Location', 'best')

(iii) Visualizing the solution on graph together
f plot (xsolt)
hold on
f plot (ysolt)
grid on

4c) Command window

clc

clear

close all

Syms t s w x k a

$$x = k * \exp(-a * t) * \sin(5 * w * t) * \cos(3 * w * t)$$

F = Laplace(x, t, s)

Simplify(F)

Sols(ans)

u) Command window

clc

clear

close all

Syms t s

$$F = \pi / ((s^2) + 15 * \pi * s + 24 * (\pi^3))$$

i Laplace(F)

Simplify(ans)

Sols(ans)