

49

Command window

clc;

clear

close all

Syms n(t)

eqn = diff(n, t, 2) - diff(n, t) - 12 * n = 144 * (t^3) + 12 * 5;

Cond = n(0) == 5, diff(n, t, 1) == -0.5

ysol = dsolve(eqn, Cond)

t = 0:0.1:0.5

Israel = subs(ysol)

fplot(Israel)

grid on

legend(Israel, 'location: best')

$$Israel = 3 * t^2 - \exp(-3 * t) + (3 * 5) - (13 * t) / 2 - 12 * t^3 + (3 * \exp(4 * t))$$

Question 4B

- 1 Command window;
- 2 clc;
- 3 clear;
- 4 close all;
- 5
- 6 Syms x(t) y(t)
- 7 eqn1 = diff(y,t) - 2*x == exp(-2*t);
- 8 eqn2 = diff(x,t) + y == exp(-t)
- 9 eqns = [eqn1 eqn2]
- 10 Cond = x(0) == 0, y(0) == 0;
- 11 Ans = dsolve(eqns, Cond)
- 12 xSol(t) = Ans.x
- 13 ySol(t) = Ans.y

(1) $xSol(t) = \cos(2^{1/2}t)/2 - \exp(-2t)/6 - \exp(-t)/3 = (5 \sin(2^{1/2}t))$
 $ySol(t) = (2 \exp(-t))/3 - \exp(-2t)/3 + (2^{1/2}) \sin(2^{1/2}t)/2 + 2^{1/2} \cos(2^{1/2}t)$

Visualizing the solution on graph separately continue with

- iv f plot(xSol)
- f plot(ySol)
- grid on
- Legend(xSol, 'Location', 'best')
- Legend(ySol, 'Location', 'best')

Visualizing the solution on graph together continue with

- f plot(xSol)
- hold on
- f plot(ySol)
- grid on
- Legend(xSol, ySol, 'Location', 'best')

4C

i Command window

clc

clear

close all

Syms t s w k a

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

$$F = \text{laplace}(x, t, s)$$

Simplify(F)

pretty(ans)

ii Command window

clc

clear

close all

Syms t S

$$F = \pi * / (CS^2 + 19 * \pi * S + 24 * (\pi^3))$$

laplace(F)

Simplify(ans)

pretty(ans)