4A

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,2) == -0.5;
ysol = dsolve (eqn, cond)
t = 0: 0.1 : 0.5
seun = subs (ysol)
fplot (seun)
grid on
legend ('seun', 'Location', 'best')
```

4B

Command window

```
clc
clear
close

syms x(t) y(t)
eqn1 = diff(y,t) - 2*x == exp(-2*t);
eqn2 = diff(x,t) + y == exp(-t);
eqn3 = [eqn1, eqn2]
cond = x(0) == 0, y(0) == 0;
Ans = dsolve (eqns, cond)
xsol(t) = Ans.x
ysol(t) = Ans.y
```

Visualising the solution on graph seperately continue with

```
fplot(xsol)
fplot(ysol)
grid on
legend ('xsol', 'location', 'best')
legend ('ysol', 'location', 'best')
```

visualizing the solution on graphs together continue

```
fplot (xsol)
hold on
fplot (ysol)
grid on
legend ('xsol', 'ysol', 'location', 'best')
```

4C

Command window

```
clc
clear
close all

syms t s w x K a
x = K * exp(-a*t) * sin(5*w*t) * cos(3wt)
F = Laplace (x, t, s)
simplify (F)
pretty (ans)
```

Command window

```
clc
clear
close all

syms t s
F = Pi * t / ((s^2) + 15 * Pi * 5 + 24 * (Pi^3))
ilaplace (F)
simplify (ans)
pretty (ans)
```