# Task 1

## Code

%Task 1

%vector

**Fs\_v = [5 3 10 25 20]**

**Gt\_v = [1 0 -1 1 0 -19]**

%symbolic

**syms s t;**

**Fs\_s = 5\*s^4 + 3\*s^3 + 10\*s^2 + 25\*s + 20**

**Gt\_s = t^5 -t^3 + t^2 - 19**

## Output

Fs\_v =

**5 3 10 25 20**

Gt\_v =

**1 0 -1 1 0 -19**

Fs\_s =

**5\*s^4 + 3\*s^3 + 10\*s^2 + 25\*s + 20**

Gt\_s =

**t^5 - t^3 + t^2 - 19**

# Task 2

## Code

%Task 2

%finding roots of both

**F\_roots = roots(Fs\_v)**

**G\_roots = roots(Gt\_v)**

## Output

F\_roots =

**0.6663 + 1.7189i**

**0.6663 - 1.7189i**

**-0.9663 + 0.4931i**

**-0.9663 - 0.4931i**

G\_roots =

**1.8546 + 0.0000i**

**0.6346 + 1.6447i**

**0.6346 - 1.6447i**

**-1.5619 + 0.9257i**

**-1.5619 - 0.9257i**

# Task 3

## Input

%Task 3

**X\_v = poly([2, 4, -5, -13])**

**X\_roots = roots(X\_v)**

## Output

X\_v =

**1 12 -35 -246 520**

X\_roots =

**-13.0000**

**-5.0000**

**4.0000**

**2.0000**

# Task 5

## Code

%Task 5

%finding residues

**[Hs\_a, Hs\_b] = residue([1 3 2], sym2poly(s\*(s^3 - 6\*s^2 + 5\*s + 15)))**

## Output

Hs\_a =

**-0.0690 - 1.1858i**

**-0.0690 + 1.1858i**

**0.0047 + 0.0000i**

**0.1333 + 0.0000i**

Hs\_b =

**3.5705 + 0.6317i**

**3.5705 - 0.6317i**

**-1.1409 + 0.0000i**

**0.0000 + 0.0000i**

# Task 6

## Code

%Task 6

**syms w**

%laplace of three functions with inverses

**fa = laplace(t^3);**

**pretty(fa)**

**pretty(ilaplace(fa))**

**fb = laplace(sin(w\*t));**

**pretty(fb)**

**pretty(ilaplace(fb))**

**fc = laplace(cos(w\*t));**

**pretty(fc)**

**pretty(ilaplace(fc))**

%laplace of I(s) and I(x)

**Is = 2\*((s^2 + 6\*s + 16)/(s \* (s^2 + 4\*s + 8)));**

**Is\_inv = ilaplace(Is);**

**pretty(Is)**

**Ix\_inv = ilaplace((Is + 0.5)\*4\*(s + 4));**

**pretty(Ix\_inv);**

## Output

**6**

**--**

**4**

**s**

**3**

**t**

**w**

**-------**

**2 2**

**s + w**

**sin(t w)**

**s**

**-------**

**2 2**

**s + w**

**cos(t w)**

**2**

**(s + 6 s + 16) 2**

**-----------------**

**2**

**s (s + 4 s + 8)**

**16 dirac(t) - exp(-2 t) (cos(2 t) - sin(2 t)) 16 + 2 dirac'(t) + 64**