Homework 1

Problem 1

See attached PDF for solution.

Problem 2

See attached PDF for solution.

Problem 3

Also see attached PDF.

```
num = [1 5 6 9 30];
den = [1 6 21 46 30];
[r,p,k] = residue(num,den)
% TODO: format output.

syms s
F = (s^4+5*s^3+6*s^2+9*s+30)/(s^4+6*s^3+21*s^2+46*s+30);
ilaplace(F)
% TODO: format output.
```

```
r =

  -1.0812 + 1.7051i
  -1.0812 - 1.7051i
  -0.1154 + 0.0000i
   1.2778 + 0.0000i


p =

  -1.0000 + 3.0000i
  -1.0000 - 3.0000i
  -3.0000 + 0.0000i
  -1.0000 + 0.0000i


k =

     1
```

```
ans =

(23*exp(-t))/18 - (3*exp(-3*t))/26 + dirac(t) - (253*exp(-t)*(cos(3*t) + (399*sin(3*t))/253)
```

Problem 4

Also see attached PDF.

```
z = [-1; -2];
p = [0; -4; -6; 2+3i; 2-3i];
k = 5;
[num,den] = zp2tf(z,p,k);
printsys(num,den,'s')
% TODO: format output.
```

```
num/den =

            5 s^2 + 15 s + 10
   -----------------------------------
   s^5 + 6 s^4 - 3 s^3 + 34 s^2 + 312 s
```

Problem 5

Also see attached PDF.

```
syms w
F = 5/(s^2*(s^2+w^2));
ilaplace(F)
% TODO: format output.
```

```
ans =

(5*t)/w^2 - (5*sin(t*w))/w^3
```

Problem 6

Also see attached PDF.

```
dsolve('D2x+3*Dx+2*x=0','x(0)=-1, Dx(0)=2')
% TODO: format output.

ans =

-exp(-2*t)
```