UNIVERSITY
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Assignment Cover Sheet

Student Name	**Student number**
Taha Yaseen Parker	8243578

Subject code and name	ECTE202 – Circuits and Systems
Lab Instructor	Ms. Eva Barbulescu
Title of Assignment	Lab 6
Lab Number	6

Student declaration and acknowledgment

By submitting this assignment online, the submitting student declares on behalf of the team that:

1. All team members have read the subject outline for this subject, and this assessment item meets the requirements of the subject detailed therein.
2. This assessment is entirely our work, except where we have included fully documented references to the work of others. The material in this assessment item has yet to be submitted for assessment.
3. Acknowledgement of source information is by the guidelines or referencing style specified in the subject outline.
4. All team members know the late submission policy and penalty.
5. The submitting student undertakes to communicate all feedback with the other team members.

Lab 6

Task 1: Application of Laplace and Inverse Laplace Transforms in MATLAB

Laplace Transform

```
syms t s
x1 = (1/4) * sin(t);
x2 = (5-exp(-t))/(4*sqrt(pi*(t^3)));
x3 = cos(1/(2*t))/sqrt(pi*t);

S1 = laplace(x1, t, s);
S2 = laplace(x2, t, s);
S3 = laplace(x3, t, s);

disp(table([x1; x2; x3], [S1; S2; S3], 'VariableNames', {'Function',
'Laplace Transform'}));
```

Function	Laplace Transform
sin(t)/4	1/(4*(s^2 + 1))
-(exp(-t) - 5)/(4*pi^(1/2)*(t^3)^(1/2))	-(laplace(1/t^(3/2), t, s + 1) - 5*laplace(exp(t)/t^(3/2), t, s + 1))/(4*pi^(1/2))
cos(1/(2*t))/(t^(1/2)*pi^(1/2))	laplace(cos(1/(2*t))/t^(1/2), t, s)/pi^(1/2)

Inverse Laplace Transform

```
syms s t a
x1 = 1 / ((s-a)^2);
x2 = exp(-2 * s)/sqrt(s^2 + 1);
x3 = (2/5)*(log((s)^2));

S1 = ilaplace(x1, s, t);
S2 = ilaplace(x2, s, t);
S3 = ilaplace(x3, s, t);

disp(table([x1; x2; x3], [S1; S2; S3], 'VariableNames', {'Function',
'Inverse Laplace Transform'}));
```

Function	Inverse Laplace Transform
1/(a - s)^2	t*exp(a*t)
exp(-2*s)/(s^2 + 1)^(1/2)	heaviside(t - 2)*besselj(0, t - 2)
(2*log(s^2))/5	(4*ilaplace(log(s), s, t))/5

Task 2: Inverse Laplace Transform Using Partial Fraction Expansion

```
num1 = [3 3 1];
den1 = [1 3 2 0 0];

num2 = [2 1];
den2 = [2 2 0 0];

num3 = [1 4 1 2];
den3 = [1 3 1];

% Decomposing into partial fractions
[r1, p1, k1] = residue(num1,den1)
[r2, p2, k2] = residue(num2,den2)
[r3, p3, k3] = residue(num3,den3)
```

```
r1 =

   -1.7500
    1.0000
    0.7500
    0.5000

r2 =

   -0.5000
    0.5000
    0.5000

r3 =

   -3.9597
    0.9597

p1 =

   -2
   -1
    0
    0

p2 =

   -1
    0
    0

p3 =

   -2.6180
   -0.3820

k1 =

     []

k2 =

     []

k3 =

     1     1
```