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```
%Mathias Frazier
%Section 242
%Matlab Project 2
```

Task 1

```
mat1 = [3 2 8 -1 ; 0 -1 -3 5 ; 2 2 -2 7; 5 1 0 1];
det(mat1)
```

```
ans =

  -461
```

Task 2

```
syms b;
matb = [3 b 2; b b 5; 1 -1 5];
solve(det(matb) == 0, b)
```

```
ans =

8/5 - 139^(1/2)/5
139^(1/2)/5 + 8/5
```

Task 3

```
syms x
factor(x^2-7*x+10)
```

```
ans =

[x - 2, x - 5]
```

Task 4

```
fact = (x^8 - 18*x^6 - 4*x^5 - 51*x^4 + 612*x^3 - 216*x^2 + 648*x - 4860)
factor(fact,'FactorMode','Complex')
```

```
fact =

x^8 - 18*x^6 - 4*x^5 - 51*x^4 + 612*x^3 - 216*x^2 + 648*x - 4860


ans =

[x + 5.0, x - 3.0, x - 3.0, x -
3.0, x + 1.0 + 2.2360679774997896964091736687313i,
x + 1.0 + 2.2360679774997896964091736687313i, x +
1.0 - 2.2360679774997896964091736687313i, x + 1.0 -
2.2360679774997896964091736687313i]
```

Task 5

```
syms y(t)
Dy = diff(y);
D2y = diff(y,2);
dsolve(D2y-3*Dy+10*y==0,y(0)==1,Dy(0)==17)
```

```
ans =

exp((3*t)/2)*cos((31^(1/2)*t)/2) + 31^(1/2)*exp((3*t)/2)*sin((31^(1/2)*t)/2)
```

Task 6

```
D3y = diff(y,3);
D4y = diff(y,4);
D5y = diff(y,5);

ODE = D5y - 9*D4y + 36*D3y - 108*D2y + 243*Dy - 243*y == 0;
dsolve(ODE)
```

```
ans =
```

```
C4*cos(3*t) + C1*exp(3*t) - C5*sin(3*t) + C2*t*exp(3*t) + C3*t^2*exp(3*t)
```

Task 7

```
syms y(t)
ODEIVP = D2y - Dy - 2*y == cos(t);
dsolve(ODEIVP)
```

```
ans =

C1*exp(-t) - (10^(1/2)*cos(t - atan(1/3)))/10 + C2*exp(2*t)
```

Task 8

```
ODEIVP2 = D3y + 3*D2y - 4*Dy == t + cos(t);
dsolve(ODEIVP2, y(0)==0, Dy(0)==1, D2y(0)==3)
```

```
ans =

(497*exp(-4*t))/5440 - (3*t)/16 + (17*exp(t))/10 - (34^(1/2)*cos(t -
atan(5/3)))/34 - t^2/8 - 109/64
```

Task 9

```
clear all
syms s t

Laplace1 = t^3 * sin(2*t);
simplify(laplace(Laplace1))
```

```
ans =

(48*s*(s^2 - 4))/(s^2 + 4)^4
```

Task 10

```
Laplace2 = ((2*t^2 - t) * cos(5*t));
simplify(laplace(Laplace2))
```

```
ans =

-(s^4 - 4*s^3 + 300*s - 625)/(s^2 + 25)^3
```

Task 11

```
ilaplace(1 / ((s-2)^3))
```

```
ans =

(t^2*exp(2*t))/2
```

Task 12

```
ILAP = (s^2 + s + 1) / (s^3 - 5*s^2 - 2*s);
ilaplace(ILAP)
```

```
ans =

(3*exp((5*t)/2)*(cosh((33^(1/2)*t)/2) + (33^(1/2)*sinh((33^(1/2)*t)/2))/
11))/2 - 1/2
```

Published with MATLAB® R2024a