```
(*DJ sa konstantnim koeficijentima*)

(*Zadatak 1*)
sol = DSolve[y'''[x] - 5 * y''[x] + 6 * y'[x] == 0, y, x]
```

$$\left\{\left\{y \to \text{Function}\left[\{x\}, \frac{1}{2} e^{2x} C[1] + \frac{1}{3} e^{3x} C[2] + C[3]\right]\right\}\right\}$$

```
(*Zadatak 2*)
sol = DSolve[y'''[x] - 3 * y''[x] + 9 * y'[x] + 13 * y[x] == 0, y, x]
```

$$\left\{\left\{y \to \text{Function}\left[\{x\}, e^{-x} C[3] + e^{2x} C[2] \text{Cos}[3x] + e^{2x} C[1] \text{Sin}[3x]\right]\right\}\right\}$$

```
(*Zadatak 3*)
sol = DSolve[y'''[x] - 5 * y''[x] + 8 * y'[x] - 4 * y[x] == 0, y, x]
```

$$\left\{\left\{y \to \text{Function}\left[\{x\}, e^{x} C[1] + e^{2x} C[2] + e^{2x} x C[3]\right]\right\}\right\}$$

```
(*Zadatak 4*)
sol = DSolve[y''''[x] + 2 * y''[x] + y[x] == 0, y, x]
```

$$\{\{y \to \text{Function}[\{x\}, C[1] \text{Cos}[x] + x C[2] \text{Cos}[x] + C[3] \text{Sin}[x] + x C[4] \text{Sin}[x]]\}\}$$

```
(*Zadatak 5*)
sol1 = DSolve[y'''[x] - 3 * y''[x] + 3 * y'[x] - y[x] == 0, y, x]
```

$$\left\{\left\{y \to \text{Function}\left[\{x\}, e^{x} C[1] + e^{x} x C[2] + e^{x} x^2 C[3]\right]\right\}\right\}$$

```
sol2 = y[x] /. sol1[[1]] /. {C[1] → 0, C[2] → 0, C[3] → 1}
```

$$e^{x} x^2$$

```
(*Zadatak 6*)

sol = DSolve[(x + 1) ^2 * y''[x] + 3 * (x + 1) 8 y[x] + y[x] == 0, y[x], x]
```

$$\left\{\left\{y[x] \to i^{1-i\sqrt{3}}\, 2^{1+\frac{i\sqrt{3}}{2}+\frac{1}{2}\left(1-i\sqrt{3}\right)} \times 3^{\frac{i\sqrt{3}}{2}+\frac{1}{2}\left(1-i\sqrt{3}\right)} \left(1+2x+x^2\right)^{\frac{i\sqrt{3}}{4}+\frac{1}{4}\left(1-i\sqrt{3}\right)} \right.\right.$$
$$\text{BesselI}\left[-i\sqrt{3}, 4\sqrt{6}\left(1+2x+x^2\right)^{1/4}\right] C[1] \text{Gamma}\left[1-i\sqrt{3}\right] +$$
$$i^{1+i\sqrt{3}}\, 2^{1-\frac{i\sqrt{3}}{2}+\frac{1}{2}\left(1+i\sqrt{3}\right)} \times 3^{-\frac{i\sqrt{3}}{2}+\frac{1}{2}\left(1+i\sqrt{3}\right)} \left(1+2x+x^2\right)^{-\frac{i\sqrt{3}}{4}+\frac{1}{4}\left(1+i\sqrt{3}\right)}$$
$$\left.\left.\text{BesselI}\left[i\sqrt{3}, 4\sqrt{6}\left(1+2x+x^2\right)^{1/4}\right] C[2] \text{Gamma}\left[1+i\sqrt{3}\right]\right\}\right\}$$

```
(*Ove specijalne funkcije se takodje mogu crtati*)

(*Zadatak 7*)
sol = DSolve[(1 + x^2) ^2 * y''[x] + 2 * x * (1 + x^2) * y'[x] + y[x] == 0, y[x], x]
```

$$\left\{\left\{y[x] \to \frac{C[1]}{\sqrt{1+x^2}} + \frac{x C[2]}{\sqrt{1+x^2}}\right\}\right\}$$

```
(*Zadatak 8*)
sol = DSolve[x^2 * y''[x] - 2 * x * y'[x] + (x^2 + 2) * y[x] == 0, y[x], x]
```

$$\left\{\left\{y[x] \to e^{-ix} x C[1] - \frac{1}{2} i e^{ix} x C[2]\right\}\right\}$$

```
(*Zadatak 9*)
```

```
sol = DSolve[x * y'''[x] + 3 * y''[x] + x * y'[x] + y[x] == 0, y[x], x]

(*Nehomogena*)
(*Zadatak 1*)
sol = DSolve[y''[x] + y[x] == Sin[x] + Cos[2 * x], y[x], x]
```

$$\left\{\left\{y[x] \to C[1]\,\text{Cos}[x] + C[2]\,\text{Sin}[x] + \frac{1}{12}\left(-6\,x\,\text{Cos}[x] - 6\,\text{Cos}[x]^2 + 2\,\text{Cos}[x]\,\text{Cos}[3\,x] - 6\,\text{Cos}[x]^2\,\text{Sin}[x] + 6\,\text{Sin}[x]^2 + 3\,\text{Cos}[x]\,\text{Sin}[2\,x] + 2\,\text{Sin}[x]\,\text{Sin}[3\,x]\right)\right\}\right\}$$

```
(*Zadatak 2*)
sol = DSolve[x^2 * y''[x] + 8 * x * y'[x] + 12 * y[x] == x^2 * (30 * Log[x] + 21), y[x], x]
```

$$\left\{\left\{y[x] \to \frac{C[1]}{x^4} + \frac{C[2]}{x^3} + \frac{1}{3}x^2\left(1 + 3\,\text{Log}[x]\right)\right\}\right\}$$

```
(*Zadatak 3*)
sol = DSolve[(x^2 - 1) * x^2 * y''[x] - (x^2 - 2) * x * y'[x] + (x^2 - 2) * y[x] == x^3, y[x], x]
```

$$\left\{\left\{y[x] \to \frac{x\left(-1+x^2\right)^{1/4}C[1]}{\left(1-x^2\right)^{1/4}} + \frac{x\left(-1+x^2\right)^{1/4}C[2]\,\text{Log}\left[x+\sqrt{-1+x^2}\right]}{\left(1-x^2\right)^{1/4}} - \frac{x\left(-1+x^2\right)^{7/4}\text{Log}\left[x+\sqrt{-1+x^2}\right]^2}{2\left(1-x^2\right)^{1/4}\left(-\left(-1+x^2\right)^2\right)^{3/4}}\right\}\right\}$$

```
(*Zadatak 4*)

sol = DSolve[x^2 * y''[x] - 2 * y[x] == 1, y[x], x]
```

$$\left\{\left\{y[x] \to -\frac{1}{2} + x^2\,C[1] + \frac{C[2]}{x}\right\}\right\}$$