

```
> restart: assume(0 < t < Pi/4);
```

```
> eq1 := diff(y(t), t, t) + 2/sin(2*t) * diff(y(t), t) + y(t) = 0;
```

$$eq1 := \frac{d^2}{dt^2} y(t) + \frac{2 \left(\frac{d}{dt} y(t) \right)}{\sin(2t)} + y(t) = 0 \quad (1)$$

```
> dsolve(eq1, y(t));
```

$$y(t) = \frac{_{-}C1 (\cos(2t) - 1) (\cos(2t) + 1) \text{LegendreP}\left(-\frac{1}{2}, 1, \frac{\cos(2t) + 3}{\cos(2t) - 1}\right)}{\sin(2t) \left(\sqrt{-(\sin(2t) - 1) (\sin(2t) + 1)} + 1\right)} + \frac{_{-}C2 (\cos(2t) - 1) (\cos(2t) + 1) \text{LegendreQ}\left(-\frac{1}{2}, 1, \frac{\cos(2t) + 3}{\cos(2t) - 1}\right)}{\sin(2t) \left(\sqrt{-(\sin(2t) - 1) (\sin(2t) + 1)} + 1\right)} \quad (2)$$

```
> simplify(%);
```

$$y(t) = \frac{1}{\sin(2t)} \left((\cos(2t) - 1) \left(_{-}C1 \text{LegendreP}\left(-\frac{1}{2}, 1, \frac{\cos(2t) + 3}{\cos(2t) - 1}\right) + _{-}C2 \text{LegendreQ}\left(-\frac{1}{2}, 1, \frac{\cos(2t) + 3}{\cos(2t) - 1}\right) \right) \right) \quad (3)$$

```
> restart;
```

```
> assume(Pi/4 < t < Pi/2);
```

```
> eq2 := diff(y(t), t, t) + 2/sin(2*t) * diff(y(t), t) + y(t) = 0;
```

$$eq2 := \frac{d^2}{dt^2} y(t) + \frac{2 \left(\frac{d}{dt} y(t) \right)}{\sin(2t)} + y(t) = 0 \quad (4)$$

```
> dsolve(eq2, y(t));
```

$$y(t) = \frac{_{-}C1 (\cos(2t) + 1) (\cos(2t) - 1) \text{LegendreP}\left(-\frac{1}{2}, 1, \frac{\cos(2t) - 3}{\cos(2t) + 1}\right)}{\sin(2t) \left(\sqrt{-(\sin(2t) - 1) (\sin(2t) + 1)} + 1\right)} + \frac{_{-}C2 (\cos(2t) + 1) (\cos(2t) - 1) \text{LegendreQ}\left(-\frac{1}{2}, 1, \frac{\cos(2t) - 3}{\cos(2t) + 1}\right)}{\sin(2t) \left(\sqrt{-(\sin(2t) - 1) (\sin(2t) + 1)} + 1\right)} \quad (5)$$

```
> simplify(%);
```

$$y(t) = -\frac{1}{\sin(2t)} \left((\cos(2t) + 1) \left(_{-}C2 \text{LegendreQ}\left(-\frac{1}{2}, 1, \frac{\cos(2t) - 3}{\cos(2t) + 1}\right) + _{-}C1 \text{LegendreP}\left(-\frac{1}{2}, 1, \frac{\cos(2t) - 3}{\cos(2t) + 1}\right) \right) \right) \quad (6)$$

```
>
```