In[71]:=
```
diffeq = (4 x^2 y''[x]) - (8 x^2 y'[x]) + (((4 x^2) + 1) y[x]) == 0;
sol = DSolve[diffeq, y[x], x]
diffeq2 = (3 x^2 g''[x]) + (2 x g'[x]) + ((x^2) g[x]) == 0;
sol2 = DSolve[diffeq2, g[x], x]
g1[x_] := ((x^(1 / 6)) BesselJ[1 / 6, x / Sqrt[3]]) (2 ^ (1 / 6)) (3^ (1 / 12)) Gamma[7 / 6] ;
g2[x_] :=
  ((x^(1 / 6)) BesselY[1 / 6, x / Sqrt[3]]) (-Pi) (3^(-1 / 12)) (Gamma[1 / 6]^(-1)) / (2 ^(1 / 6));
Series[g1[x], {x, 0, 6}]
Series[g2[x], {x, 0, 4}]
```

Out[72]=
$$\left\{\left\{y[x] \to e^{x} \sqrt{x}\, C[1] + e^{x} \sqrt{x}\, C[2] \operatorname{Log}[x]\right\}\right\}$$

Out[74]=
$$\left\{\left\{g[x] \to x^{1/6} \operatorname{BesselJ}\left[\frac{1}{6}, \frac{x}{\sqrt{3}}\right] C[1] + x^{1/6} \operatorname{BesselY}\left[\frac{1}{6}, \frac{x}{\sqrt{3}}\right] C[2]\right\}\right\}$$

Out[77]=
$$x^{1/3} - \frac{x^{7/3}}{14} + \frac{x^{13/3}}{728} + O[x]^{19/3}$$

Out[78]=
$$1 + \frac{\left(\frac{3}{2}\right)^{1/3} \operatorname{Gamma}\left[-\frac{1}{6}\right] x^{1/3}}{2 \operatorname{Gamma}\left[\frac{1}{6}\right]} - \frac{x^2}{10} - \frac{\left(\left(\frac{3}{2}\right)^{1/3} \operatorname{Gamma}\left[-\frac{1}{6}\right]\right) x^{7/3}}{28 \operatorname{Gamma}\left[\frac{1}{6}\right]} + \frac{x^4}{440} + O[x]^{25/6}$$