1 Examples on variation of parameters

1.
   1. $\frac{d^2y}{dx^2} + 4y = \tan 2x$
   2. $\frac{d^2y}{dx^2} + y = x \sin x$
   3. $(D^2 + 3D + 2)y = \sin e^x$
   4. $(D^2 - 2D)y = e^x \sin x$
   5. $(D^2 + 1)y = 3x - 8 \cot x$
   6. $(D^2 - 4D + 4)y = e^{2x} \sec^2 x$
   7. $(D^2 + D)y = (1 + e^x)^{-1}$
   8. $(D^2 - 2D + 2)y = e^x \tan x$
   9. $(D^2 + 1)y = cosecx$
   10. $(D^2 - 1)y = \frac{2}{1+e^x}$

2 Examples on Cauchy's and Legendre's Linear Differential Equation

2.
   1. $(x^2 D^2 - xD + 4)y = \cos(\log x) + x \sin(\log x)$
   2. $(x^3 D^2 + 3x^2 D + x)y = \sin(\log x)$
   3. $(x^2 D^2 - 4xD + 6)y = x^5$
   4. $(x^2 D^2 - xD + 1)y = x \log x$
   5. $(2x + 3)^2 \frac{d^2y}{dx^2} - 2(2x + 3)\frac{dy}{dx} - 12y = 6x$
   6. $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = 4 \cos[\log(1 + x)]$
   7. $(x + 2)^2 \frac{d^2y}{dx^2} + 3(x + 2)\frac{dy}{dx} + y = 4 \sin[\log(x + 2)]$
   8. $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} = (2x + 3)(2x + 4)$
   9. $(x + 2)^2 \frac{d^2y}{dx^2} - (x + 2)\frac{dy}{dx} + y = 3x + 4$
   10. $7(2 + x)^2 \frac{d^2y}{dx^2} + 8(2 + x)\frac{dy}{dx} + y = 4 \cos[\log(2 + x)]$