Problem set-9 Hints and Answers

1. a. Ans: $y(x) = (A + B\log x)x^2 + x^2(\log x)^2$
   b. Ans: $y(x) = x^{-3}(A\cos(2\log x) + B\sin(2\log x)) + \frac{1}{169}(13\log x - 6)$
   c. Ans: $y(x) = Ax^2 + Bx^3 + \frac{1}{2}x^4$
   d. Ans: $y(x) = Ax + B\frac{1}{x} + \frac{1}{m^2-1}x^m$
   e. Ans: $y(x) = x^2(A\cos(\log x) + B\sin(\log x)) + \frac{1}{8}(\sin(\log x) + \cos(\log x))$
   f. Ans:$y(x) = x(A + B\log x) + 4 + 2\log x$
   g. Ans:$y(x) = x^m(A\cos(n\log x) + B\sin(n\log x)) + x^m\log x$
   h. Ans:$y(x) = x(A\cos(\log x) + B\sin(\log x)) + x\log x$
   i. Ans:$y(x) = x^2(A\cos(\log x) + B\sin(\log x)) - \frac{x^2}{2}\log x\cos(\log x)$
   j. Ans:$y(x) = (A+B\log x)\cos(\log x)+(C+D\log x)\sin(\log x)+(\log x)^2+2(\log x)-3$

2. a. Ans: $y(x) = A(x+1)^2 + B(x+1)^3 + 3(x+1)$
   b) Ans:$y(x) = A + B\log(x+1) + (1+x)^2 + 6(1+x) + (\log(1+x))^2$
   c) Ans: $y(x) = (1+2x)^2[A + B\log(1+2x) + (\log(1+2x))^2]$

3. a. Ans: $y(x) = A + Be^{2x} - \frac{1}{2}e^x\sin x$
   b. Ans: $y(x) = (A + Bx)e^{3x} - e^{3x}(\log x + 1)$
   c. Ans $y(x) = (A + Bx)e^x + \frac{1}{4}x^2e^x(2\log x - 3)$
   d. Ans $y(x) = A + B\cos x + C\sin x + \ln(\sec x) + (\cos x)^2 + (\sin x)^2 - \sin\ln(\sec x + \tan x)$
   e. Ans $y(x) = Ae^{-3t} + Be^{-t} + Ce^{6t} - \frac{1}{6} + \frac{5}{49}e^{-t} - \frac{2}{7}te^{-t}$
   f. Ans $y(x) = e^x(A\cos x + B\sin x) - e^{-x}\cos x\log(\sec x + \tan x)$

4. a. Ans: $y(x) = -\frac{1}{4} + \frac{1}{4}e^{2x} - \frac{1}{2}e^x\sin x$

5. a. Ans: $x = A\cos t + B\sin t + 2, y = -A\sin t + B\cos t - t$
   b. Ans: $x = Ae^t + Be^{-3t} - te^t, y = e^t - Ae^t + Be^{-3t} + te^t$
   c. Ans: $x = Ae^t + Be^{-5t} + \frac{3}{7}e^{2t} - \frac{1}{25}(10t + 13), y = Ae^t - Be^{-5t} + \frac{4}{7}e^{2t} - \frac{3}{5}t - \frac{12}{25}$
   d. Ans :$x = \frac{A-3B}{5}\sin t - \frac{3A+B}{5}\cos t - t - 1 + 2e^t, y = A\cos t + B\sin t + 1 + 2t - \frac{5}{2}e^t$