Problem Set - 8

Answer/Hints

1

a. $y = C_1 e^{\frac{5x}{2}} + C_2 e^{2x}$

b. $y = (C_1 + xC_2)e^{4x}$

c. $C_1 \cos 3x + C_2 \sin 3x$

d $y = C_1 e^x + C_2 e^{3x}$

e. $(C_1 + xC_2)\cos 2x + (C_3 + xC_4)\sin 2x$

f. $C_1 e^{\frac{ax(1+i)}{\sqrt{2}}} + C_2 e^{\frac{-ax(1+i)}{\sqrt{2}}} + C_3 e^{\frac{ax(1-i)}{\sqrt{2}}} + C_4 e^{\frac{-ax(1-i)}{\sqrt{2}}}$

g. $C_1 + xC_2 + e^x(C_3 + xC_4 + x^2 C_5)$

h. $(C_1 + xC_2)e^{2x} + C_3 e^{-x}$

i. $e^{-x}(C_1 \cos x + C_2 \sin x) + xe^{-x}(C_3 \cos x + C_4 \sin x)$

2 (Hint:Solve the differential equation and eliminate the arbitrary constants by putting the value at x=0)

a. $2e^{4x} + e^{-3x}$

b. $e^{-\frac{x}{2}}(2\cos 3x - \sin 3x)$

c. $e^{-\frac{x}{3}}(6\cos\frac{2x}{3} + 3\sin\frac{2x}{3})$

d $\dfrac{2}{5}e^{-3x} + \dfrac{3}{5}e^{2x}$

e. $e^{-\frac{x}{2}}(\cos\frac{\sqrt{3}}{2}x + \sqrt{3}\sin\frac{\sqrt{3}}{2}x)$

f. $\dfrac{14}{33}e^{-4x} + \dfrac{13}{15}e^{2x} - \dfrac{16}{55}e^{7x}$

3

a. $C_1e^{2x} + C_2e^{-2x} - \dfrac{1}{8}\sin2x$

b. $C_1e^x + C_2e^{-x} + x\sin x + (\frac{1}{2} - \frac{x^2}{2})\cos x$

c. $C_1e^{3x} + C_2e^{-x} + \dfrac{2}{5}e^{4x}$

d $C_1e^{-x} + C_2e^{3x} - \dfrac{e^x}{2} - \cos x + 2\sin x$

e. $C_1e^{9x} + C_2e^{-2x} - \dfrac{e^{-2x}}{11}(\dfrac{x^3}{3} + \dfrac{x^2}{11} + \dfrac{2x}{121})$

f. $C_1e^{2x} + C_2e^x + x^2 + 3x + \dfrac{7}{2} + 2e^{3x} - (3x + x^2)e^x$

g. $e^x(C_1\cos x + C_2\sin x) - \frac{e^x}{3}\sin2x$

h. $C_1e^x + C_2e^{3x} + C_3e^{-2x} + \dfrac{e^{4x}}{12} - \dfrac{13}{8}e^{2x} + \dfrac{3}{2}$

i. $C_1 + xC_2 + (C_3 + xC_4)e^x + \dfrac{x^5}{20} + \dfrac{x^4}{2} + 3x^2 + 12x^2$

4

b. $\cos(\sin x) + \sin(\sin x)$

c. $\dfrac{a\sin t}{2n^2\cos\alpha} - \dfrac{a}{n^3\sin2\alpha}e^{-nt\cos\alpha}\sin(nt\sin\alpha)$

d $k(\theta\sin\theta - \cos\theta)$

e. Hint:Use D-operator Method.