

DiffEq - Ch 4 - Required Practice

4.1

#1. $y = \frac{1}{2}e^x - \frac{1}{2}e^{-x}$

#2. $y = 3x - 4x \ln x$

#3. Not linearly independent.

#4. Not linearly independent.

#5. Are linearly independent.

#6. $y = C_1e^{-3x} + C_2e^{4x}$

#7. $y = C_1e^x \cos 2x + C_2e^x \sin 2x$

#8. $y = C_1x^3 + C_2x^4$

4.2

#1. $y_2 = xe^{2x}$

#2. $y_2 = \sin 4x$

#3. $y_2 = xe^{\left(\frac{2}{3}\right)x}$

#4. $y_2 = x^4 \ln|x|$

#5. $y_2 = -1 - \ln(x)$

ANSWERS ONLY

4.3

#1. $y = C_1 + C_2e^{\left(-\frac{1}{4}x\right)}$

#2. $y = C_1e^{-4x} + C_2xe^{-4x}$

#3. $y = C_1e^{\left(\frac{2}{3}x\right)} + C_2e^{\left(-\frac{1}{4}x\right)}$

#4. $y = C_1 \cos 3x + C_2 \sin 3x$

#5. $y = C_1e^{2x} \cos x + C_2e^{2x} \sin x$

#6. $y = C_1e^{\left(-\frac{1}{3}x\right)} \cos\left(\frac{\sqrt{2}}{3}x\right) + C_2e^{\left(-\frac{1}{3}x\right)} \sin\left(\frac{\sqrt{2}}{3}x\right)$

#7. $y = C_1e^{-x} + C_2e^{3x} + C_3xe^{3x}$

#8. $y = C_1e^{-x} + C_2xe^{-x} + C_3x^2e^{-x}$

#9. $y = \left(-\frac{1}{3}e\right)e^{-x} + \left(\frac{1}{3}e^{-5}\right)e^{5x}$

or $y = -\frac{1}{3}e^{(1-x)} + \frac{1}{3}e^{(-5+5x)}$

#10. $y = 0$ (the x -axis is the solution)

#11. $y = \frac{5}{36} + \left(-\frac{5}{36}\right)e^{-6x} + \left(\frac{1}{6}\right)xe^{-6x}$

4.4

#1. $y = C_1 e^{-2x} + C_2 e^{-x} + 3$

#2. $y = C_1 e^{5x} + C_2 x e^{5x} + \frac{6}{5}x + \frac{3}{5}$

#3. $y = C_1 e^{-2x} + C_2 x e^{-2x} + x^2 - 4x - 4$

#4.

$$y = C_1 \cos(\sqrt{3}x) + C_2 \sin(\sqrt{3}x) - 4x^2 e^{3x} + 4x e^{3x} - \frac{4}{3} e^{3x}$$

#5. $y = C_1 e^{-4x} + C_2 e^{4x} + \frac{1}{4} x e^{4x}$

#6. $y = C_1 \cos x + C_2 \sin x + \frac{1}{2} x \sin x - \frac{1}{2} x^2 \cos x$

#7. $y = -200 + 200e^{\left(\frac{-1}{5}x\right)} - 3x^2 + 30x$

4.6 (we skip 4.5)

#1. $y = C_1 \cos x + C_2 \sin x + \ln|\cos x| \cos x + x \sin x$

#2.

$$y = C_1 \cos x + C_2 \sin x + \frac{1}{2} x \cos x - \frac{1}{4} \sin(2x) \cos x + \frac{1}{2} \sin^3 x$$

#3. $y = C_1 e^{3x} + C_2 e^{-3x} - \frac{1}{4} x e^{-3x} - \frac{3}{4} x^2 e^{-3x}$

#4. $y = C_1 e^{-x} + C_2 e^{-2x} + e^{-x} \ln|1 + e^x| + e^{-2x} \ln|1 + e^x|$

#5. $y = C_1 e^{\left(\frac{1}{2}x\right)} + C_2 e^{\left(\frac{-1}{2}x\right)} + \frac{1}{8} x^2 e^{\left(\frac{1}{2}x\right)} - \frac{1}{4} x e^{\left(\frac{1}{2}x\right)}$

4.7

#1. $y = C_1 x^{-1} + C_2 x^2$

#2. $y = C_1 x^{-1} + C_2 x^{-3}$

#3. $y = C_1 x^{(2+\sqrt{6})} + C_2 x^{(2-\sqrt{6})}$

#4. $y = C_1 + C_3 x^5 + \frac{1}{5} x^5 \ln|x|$

#5. $y = C_1 x^{-10} + C_2 x^2$

#6. $y = C_1 x^{-1} + C_2 x^{-8} + \frac{1}{30} x^2$

DiffEq Ch4 Test Review

#1. $y_2 = e^{-5x}$

#2. $y_2 = xe^{\left(\frac{2}{3}x\right)}$

#3. Are linearly independent.

#4. Not linearly independent.

#5. $y = C_1e^{(1+\sqrt{3})x} + C_2e^{(1-\sqrt{3})x}$

#6.

$$y = C_1e^{\left(\frac{1}{2}x\right)} \cos\left(\frac{\sqrt{5}}{2}x\right) + C_2e^{\left(\frac{1}{2}x\right)} \sin\left(\frac{\sqrt{5}}{2}x\right)$$

#7. $y = C_1e^{-x} + C_2e^{3x} + C_3xe^{3x}$

#8. $y = C_1 \cos 2x + C_2 \sin 2x - \frac{3}{4}x \cos 2x$

#9. $y = 4e^{-4x} - 3xe^{-4x} + \frac{1}{8}x^2 - \frac{1}{8}x - \frac{9}{64}$

#10. $y = C_1e^{4x} + C_2e^{-4x} + \frac{1}{4}xe^{4x}$

#11. $y = C_1e^{3x} + C_3e^{-3x} - \frac{1}{4}xe^{-3x} - \frac{3}{4}x^2e^{-3x}$

#12.

$$y = C_1 \cos x + C_2 \sin x - \frac{1}{2 \cos x} + \tan x \sin x$$

#13. $y = C_1x^{\frac{1}{2}} + C_2x^{-1} + \frac{1}{15}x^2 - \frac{1}{6}x$

#14. $y = C_1 + C_3x^5 + \frac{1}{5}x^5 \ln|x|$