

Problem Set 1.1

1.  $y' + 2 \sin 2\pi x = 0$   
 $y = \frac{\cos 2\pi x}{\pi} + c$

2.  $y' + x e^{-x^2/2} = 0$   
 $y = e^{-x^2/2} + c$

3.  $y' = y$   
 $y = e^x + c$

4.  $y' = -1.5y$   
 $y = e^{-1.5x} + c$

5.  $y' = 4e^{-x} \cos x$   
 $y = 2e^{-x}(\sin x - \cos x)$

6.  $y'' = -y$   
 $y = \sin x + c$

7.  $y' = \cosh 5.13x$   
 $y' = \frac{e^{5.13x} + e^{-5.13x}}{2}$   
 $y = \frac{1}{10.26} \left[ e^{5.13x} - e^{-5.13x} \right]$

8.  $y''' = e^{-0.2x}$   
 $y = \frac{-1}{0.2 \times 0.2 \times 0.2} e^{-0.2x}$   
 $y = \frac{-1}{0.008} e^{-0.2x}$

9. (a)  $y' + 4y = 1.4$  — (i)  
 $y = ce^{-4x} + 0.35$ ,  $y(0) = 2$  — (ii)

put (ii) in (i)  
 $-4ce^{-4x} + 4ce^{-4x} + 1.40 = 1.4$   
 $\Rightarrow$  L.H.S = R.H.S  
 $\therefore y$  is the solution of the ODE

(b) put (iii) in (ii)  
 $2 = ce^{-0} + 0.35$   
 $\Rightarrow c = 1.65$   
 $\Rightarrow y = 1.65 e^{-4x} + 0.35$   
 $\downarrow$   
 particular soln.

(c)

at  $x = 0 \Rightarrow y = 2$   
 at  $x \rightarrow \infty \Rightarrow y \rightarrow 0.35$

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