Sample Final Exam 1 Answers

1. (a) $y_h(x) = c_1 + c_2 e^{-2x}$

   (b) $y_p(x) = -\dfrac{3}{2}x + \dfrac{3}{2}x^2$

   (c) $y(x) = y_h(x) + y_p(x)$

2. $2\sqrt{e^y + 3} = 5 - \cos x$

3. (a) $y(x) = c_1 x + c_2 x \ln x$

   (b) not applicable

   (c) not applicable

4. $L = \dfrac{\pi}{4}$

5. (a) $Y(s) = \dfrac{s + 4 + \frac{2}{s^2+4} + \frac{24}{s^5} - \frac{24}{s^4} + \frac{12}{s^3} - \frac{4}{s^2} + \frac{1}{s}}{s^2 + 4s + 8}$

   (b) $A + Bt + \dfrac{1}{2}Ct^2 + De^{2t} + Ee^{-t} + \displaystyle\int_0^t \cos(t - v)g(v)\,dv$

6. (a) $f(x) = \dfrac{1}{2} + \displaystyle\sum_{k=1}^{\infty} \dfrac{2}{(2k - 1)\pi}(-1)^k \cos(2k - 1)x$

7. $x(t) = 20 - 20e^{-t/2} - (20 - 20e^{-(t-5)/2})u(t - 5)$

8. $u(x, t) = 4 - 2e^{-9t}\cos 3x + 7e^{-16t}\cos 4x$