Fall, 2002 – Final Exam Answers

1. $y(x) = e^{-x}(c_1 \cos 2x + c_2 \sin 2x)$

2. $y(t) = c_1 \cos 2t + c_2 \sin 2t - \dfrac{1}{5} \cos 3t$
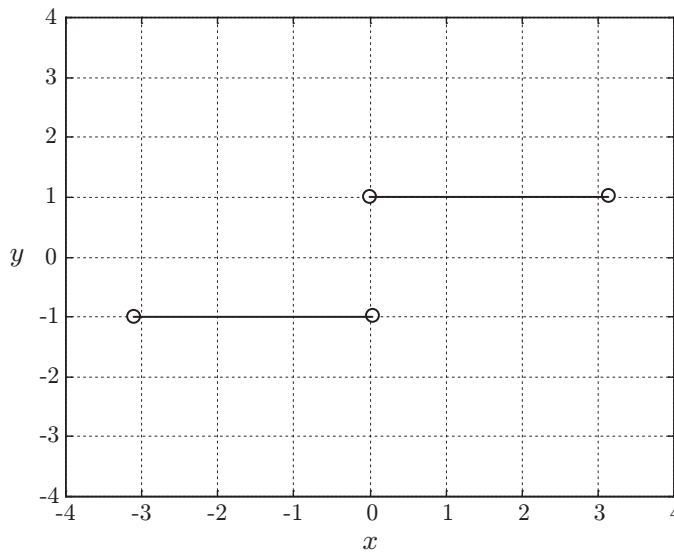
3. $y(x) = \left(\dfrac{1}{2}x + 2\right)^2$

4. $y(x) = \dfrac{1}{2}x + \dfrac{1}{2x}$

5. not applicable

6. (a) $Y(s) = \dfrac{1}{s+2} + \dfrac{e^{-3s}}{s(s+2)}$

    (b) $y(t) = e^{-2t} + \dfrac{1}{2}u(t-3) - \dfrac{1}{2}e^{-2(t-3)}u(t-3)$

7. (a)

    (b) $f(x) = \displaystyle\sum_{n=1}^{\infty} \dfrac{2}{n\pi}[1 - (-1)^n] \sin nx$

8. $u(x,t) = e^{-2t} \sin x + \dfrac{1}{3}e^{-18t} \sin 3x$

9. $x(t) = -\dfrac{21}{2}e^{3t} + \dfrac{17}{2}e^t$, $y(t) = -\dfrac{7}{2}e^{3t} + \dfrac{17}{2}e^t$

10. $y(0.1) \approx 1.1$, $y(0.2) \approx 1.21$