Section 3.2, page 151

1. $-\frac{7}{2}e^{t/2}$

2. 1

3. e^{-4t}

4. $x^2 e^x$

5. $-e^{2t}$

6. 0

7. $0 < t < \infty$

8. $-\infty < t < 1$

9. $0 < t < 4$

10. $0 < t < \infty$

11. $0 < x < 3$

12. $2 < x < 3\pi/2$

14. The equation is nonlinear.

15. The equation is nonhomogeneous.

16. No

17. $3te^{2t} + ce^{2t}$

18. $te^t + ct$

19. $5W(f, g)$

20. $-4(t\cos t - \sin t)$

21. $y_1(t) = \frac{1}{3}e^{-2t} + \frac{2}{3}e^t, \quad y_2(t) = -\frac{1}{3}e^{-2t} + \frac{1}{3}e^t$

22. $y_1(t) = -\frac{1}{2}e^{-3(t-1)} + \frac{3}{2}e^{-(t-1)}, \quad y_2(t) = -\frac{1}{2}e^{-3(t-1)} + \frac{1}{2}e^{-(t-1)}$

23. Yes

24. Yes

25. Yes

26. Yes

27. (b) Yes

(c) $[y_1(t), y_3(t)]$ and $[y_1(t), y_4(t)]$ are fundamental sets of solutions; $[y_2(t), y_3(t)]$ and $[y_4(t), y_5(t)]$ are not

29. Yes, $y = c_1 e^{-x^2/2} \int_{x_0}^x e^{t^2/2}\, dt + c_2 e^{-x^2/2}$

30. No

31. Yes, $y = \frac{1}{\mu(x)}\left[c_1 \int_{x_0}^x \frac{\mu(t)}{t}\, dt + c_2\right], \quad \mu(x) = \exp\left[-\int\left(\frac{1}{x} + \frac{\cos x}{x}\right) dx\right]$

32. Yes, $y = c_1 x^{-1} + c_2 x$

34. $x^2 \mu'' + 3x\mu' + (1 + x^2 - \nu^2)\mu = 0$

35. $(1 - x^2)\mu'' - 2x\mu' + \alpha(\alpha + 1)\mu = 0$

36. $\mu'' - x\mu = 0$

38. The Legendre and Airy equations are self-adjoint.

Section 3.3, page 158

1. Independent

2. Dependent

3. Independent

4. Dependent

5. Dependent

6. Independent

7. Independent if origin is interior to interval; otherwise dependent

8. Independent if origin is interior to interval; otherwise dependent

9. Independent; W is not always zero

10. Independent; W is not always zero

11. $W(c_1 y_1, c_2 y_2) = c_1 c_2 W(y_1, y_2) \neq 0$

12. $W(y_3, y_4) = -2W(y_1, y_2)$

13. $a_1 b_2 - a_2 b_1 \neq 0$

15. $ct^2 e^t$

16. $c \cos t$

17. c/x

18. $c/(1 - x^2)$

20. $2/25$

21. $3\sqrt{e} \cong 4.946$

22. $p(t) = 0$ for all t

26. If t_0 is an inflection point, and $y = \phi(t)$ is a solution, then from the differential equation
$p(t_0)\phi'(t_0) + q(t_0)\phi(t_0) = 0.$

Section 3.4, page 164

1. $e\cos 2 + ie\sin 2 \cong -1.1312 + 2.4717i$

2. $e^2 \cos 3 - ie^2 \sin 3 \cong -7.3151 - 1.0427i$

3. -1

4. $e^2 \cos(\pi/2) - ie^2 \sin(\pi/2) = -e^2 i \cong -7.3891i$

5. $2\cos(\ln 2) - 2i\sin(\ln 2) \cong 1.5385 - 1.2779i$

6. $\pi^{-1}\cos(2\ln\pi) + i\pi^{-1}\sin(2\ln\pi) \cong -0.20957 + 0.23959i$