Corrected Solutions for
Introduction to Partial Differential Equations
with MATLAB

Section 3.3

6. (e) $\mathrm{erf}(1/\sqrt{2})$.

Section 3.5

5. (b) $k\varphi'' + c\varphi' + +\varphi(1-\varphi) = 0$

Section 4.2 (not **4.1**)

3. For complex $z = x + iy$, $\sin z = \sin x \cosh x + i \cos x \sinh y$ and $|\sin z|^2 = \sin^2(x) + \sinh^2(y)$ so that the only zeros of $\sin z$ in the complex plane are the real points $z = n\pi$.

7. should be **8.**

Section 4.3

4. $\varphi_n(x) = \cos(\frac{n\pi x}{2L})$

Section 4.4

4. Replace $\lambda_n k$ by $-\lambda_n k$.

Section 5.4

4. $de(t)/dt = -(c^2h/2)(d/dt)u^2(0,t)$, and $\tilde{e}(t) \equiv e(t) + (c^2h/2)u^2(0,t)$.

7. $c_l = c_r(1+R)/(1-R)$.

Section 5.5

2. $B_0 = L$

4. delete $4U\cos(3n\pi/4)(n\pi)$.

6. (c) The frequencies $\omega_n = \sqrt{\lambda_n + k - d^2}$ in the case when all modes are underdamped.

11. $A_n = \frac{8L}{(n\pi)^2}\sin(\frac{n\pi}{4}) + \frac{2L}{n\pi}\cos(\frac{n\pi}{4})$, for n odd.

12. $u(x,t) = \frac{1}{\omega_2^2}[\cos(\omega_2(T-t)) - \cos(\omega_2 t)]\sin(\frac{2\pi x}{L})$

Section 5.7

3. $u(x,t) = u(x,0) + u_t(x,0)t + \frac{1}{2}u_{tt}(x,0)t^2 + O(t^3)$

Section 6.2

5. instead of **4.**

Section 6.3

3. $\hat{f}(\xi) = O(|\xi|^{-1})$ as $|\xi| \to \infty$

Section 6.5

2. When $N = 2$, $d_0 = 1$, $d_1 = 5$. When $N = 4$, $d_0 = 1$, $d_1 = 3$, $d_2 = 0$, $d_3 = 2$.

4. period of $\exp(i8\xi)$ is $\pi/4$.

Section 7.1

2. $g(\pm 2) = g'(\pm 2) = 0$, but $g''(\pm 2) = 16$ so $n = 1$.

Section 8.1

4. (a) $\frac{1}{4\pi kt} \int\int x \exp(-\frac{(x-a)^2+(y-b)^2)}{4kt})\ dxdy = \cdots$
(b) The fraction is $1 - 1/e$.

5. The denominators should be $2kt$ and $4kt$.

Section 8.3

3. (b) $-X'' = (\lambda - \mu_n)X$ (c) $(u_n)_t - k(u_n)_{xx} + k\mu_n u_n = 0$

Section 8.5

1. (b) $U(x, y) = [\cosh x - \frac{\cosh \pi}{\sinh \pi} \sinh x] \sin y$

4. (b) $A_{m,0} = \frac{a^3}{2m\pi} + (\frac{a}{m\pi})^3(\cos(m\pi) - 1)$
(c) $w(x, y, t) = [\frac{k\lambda_{1,1} \sin t - \cos t + e^{-\lambda_{1,1}kt}}{1+(\lambda_{1,1}k)^2}]\varphi_{1,1}(x, y)$

Section 8.6

7. If $\mathbf{x} \cdot \alpha > ct$.

Section 8.8

2. and **3.** should be **1.** and **2.** $\rho q(\rho, s)$ is odd.

3. (b) replace cos by sin.

Section 9.1

3. delete "dr" in the integral over the circle.

6. (b) $(1 + \rho)/(1 - \rho)$.

Section 9.2

5. $\sin(2\theta)$ should be $\cos(2\theta)$.

6. $f(\theta) = \cos(\theta) + 3\sin(\theta) - \sin(3\theta)$.

Section 9.4

3. $u(r) = -(q_0\rho^2/2) \ln r$ for $\rho < r \leq 1$.

11. (d) $r = \sqrt{x^2 + y^2} \leq \sqrt{x^2 + (y - \eta)^2} + |\eta| \leq \sqrt{x^2 + (y - \eta)^2} + a$

14. $\int_{\partial G} \ldots = -\int_G \ldots.$

Section 9.5

1. Try $u_n(x) = 1 - x^n(1 - x)^n$.

3. should be **4.**

Section 10.2

2. should be **1.**

Section 10.3

1. (a) The matrix B should be multiplied by $h = \Delta x$.