Errata (May 2024)

1) On page 13, in Fig. 1.7a, the component should be labeled $A_x\hat{\imath}$ rather than $A_y\hat{\imath}$.

2) On page 24, in Eq. 1.21, after the first equals sign, the second cosine should be a sine. So Eq. 1.21 should read

$$\frac{d^2z}{d\theta^2} = -\cos\theta - i\sin\theta = i^2(\cos\theta + i\sin\theta) = i^2 z = -z. \tag{1.21}$$

3) On page 43, in the statement of Problem 1.10, in the (a) portion of the problem, the parentheses should enclose the entire $(3x - \frac{t}{2})$ term rather than only the $(3x)$ term. Thus the function should read:

$$f(x,t) = 5\sin(3x - \frac{t}{2}).$$

and in the (c) portion of the problem, the function should be h(x,t) rather than h(y,t).

4) On page 50 in Figure 2.5, the equation on the left of the vertical axis of the bottom plot should be $\frac{\partial^2 y}{\partial x^2} = -Ak^2\sin(kx - \omega t)$.

5) On page 72, the partial derivatives on the right side of the Schrödinger Equation should be with respect to x rather than t. Thus Eqs. 2.36, 2.37, and 2.38 should read:

$$i\hbar\frac{\partial y(x,t)}{\partial t} = -\frac{\hbar^2}{2m}\frac{\partial^2 y(x,t)}{\partial x^2} + Vy(x,t). \tag{2.36}$$

$$i\hbar\frac{\partial T(t)X(x)}{\partial t} = -\frac{\hbar^2}{2m}\frac{\partial^2 T(t)X(x)}{\partial x^2} + VT(t)X(x). \tag{2.37}$$

$$\frac{i\hbar}{T(t)}\frac{\partial T(t)}{\partial t} = -\frac{\hbar^2}{2mX(x)}\frac{\partial^2 X(x)}{\partial x^2} + V. \tag{2.38}$$

6) On page 74, in the statement of Problem 2.4 an extra "t" appears in the phase term of the function, which is given as $Ae^{i(kxt-\omega t)}$ but which should be

$$Ae^{i(kx-\omega t)}.$$

7) On page 78 in the expression $k(x-\omega/kt)$, only the "k" is in the denominator, so a better way to write this is $k[x-(\omega/k)t]$.

8) On page 101, the parenthetical comment "(odd n only)" should appear on the right side of Figure 3.16.

9) On page 103, in Equation 3.27, the condition "$=\frac{1}{2}$ if $n=m$" should specify "if $n=m\neq 0$" since the value of the integral is zero if n and m are zero.

10) On page 113, in Example 3.5, the integration in the expression for $K(k)$ should be over dx rather than over dt. Thus the first lines of the solution should be

$$K(k) = \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} X(x)e^{-ikx}dx = \int_{-L}^{L} Ae^{-ikx}dx$$
$$= \frac{1}{\sqrt{2\pi}}A\frac{1}{-ik}e^{-ikx}|_{-L}^{L} = \frac{1}{\sqrt{2\pi}}\frac{A}{-ik}\left[e^{-ikL}-e^{-ik(-L)}\right]...$$

11) On page 136, the sentence beginning the last paragraph should say that the pressure on the right end of the segment is pushing in the negative-x direction.

12) On page 149, the first sentence should say "As discussed earlier in this section, for this type of harmonic wave the phase velocity is $v_{phase}=\sqrt{T/\mu}$,..." (rather than the transverse velocity).

13) On page 164, at the end of the first full paragraph, the units of magnetic field should be given as newtons per ampere-m (N/A-m).

14) The footnote on page 170 should say that Farads are equivalent to (Coulombs^2 seconds^2)/(kilograms meters^2), and Henries are equivalent to (meters^2 kilograms)/Coulombs^2.

15) On page 183, a vector arrow is missing from the first instance of the electric-field vector $\vec{E}$ in the middle line of the three-line equation for the Poynting vector, and an extraneous vertical bar appears before the symbol $\hat{k}$ in the second instance on the third line.

16) On page 201, in Figure 6.7b the range of the vertical axis for $g(x)$ should be from 0 to +1, not from -1 to +1. Here's a corrected version of that figure:

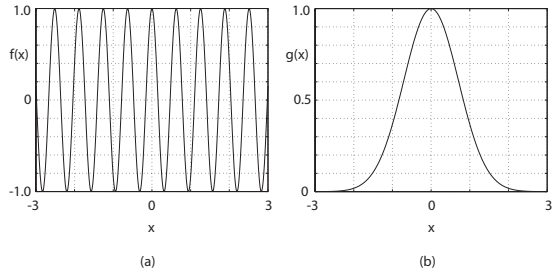

Figure 6.7 (a) The real part of the oscillating function $f(x) = e^{ikx}$ and (b) The envelope function $g(x) = e^{-ax^2}$.

17) On page 204, Figure 6.9 shows the probability density for $\psi(x)$ with a width constant $a = 1$ rather than $a = 0.1$. A correct graph of the probability density for $\psi(x) = \left(\frac{0.2}{\pi}\right)^{\frac{1}{4}} e^{-0.1x^2} e^{ikx}$ is shown below:

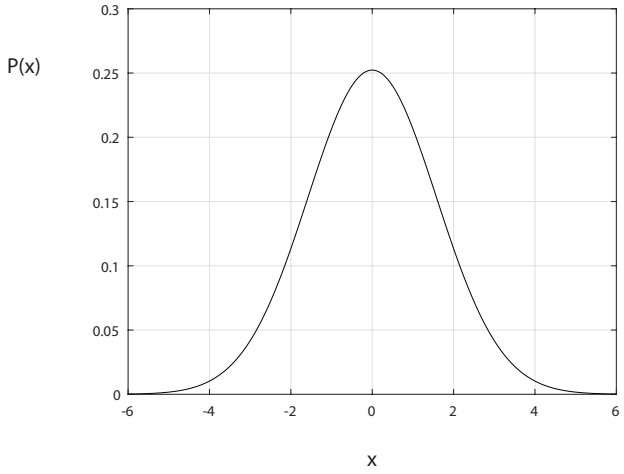

Figure 6.9: Probability density for $\psi(x) = \left(\frac{0.2}{\pi}\right)^{1/4} e^{-0.1x^2} e^{ikx}$.

18) On page 208, Equation 6.40 (as well as the Problem Statement for Problem 7 on page 213) should have a minus sign in the exponential:

$$\phi(k) = \left(\frac{\sigma_x^2}{\pi}\right)^{1/4} e^{-\frac{\sigma_x^2}{2}(k_0-k)^2}. \tag{6.40}$$

19) On page 208, the paragraph beginning with "Exactly how large..." should say that the position uncertainty is $\Delta x = \sigma_x/\sqrt{2}$ and the wavenumber uncertainty is $\Delta k = \sigma_k/\sqrt{2}$. Thus equations 6.41 and 6.42 should be

$$\Delta x \Delta k = \left(\frac{\sigma_x}{\sqrt{2}}\right)\left(\frac{\sigma_k}{\sqrt{2}}\right) = \left(\frac{\sigma_x}{\sqrt{2}}\right)\left(\frac{1}{\sigma_x\sqrt{2}}\right) = \frac{1}{2}. \tag{6.41}$$

Likewise, the product of the uncertainties in x and p is

$$\begin{aligned} \Delta x \Delta p &= \left(\frac{\sigma_x}{\sqrt{2}}\right)\left(\frac{\sigma_p}{\sqrt{2}}\right) = \left(\frac{\sigma_x}{\sqrt{2}}\right)\left(\frac{\hbar\sigma_k}{\sqrt{2}}\right) \\ &= \left(\frac{\sigma_x}{\sqrt{2}}\right)\left(\frac{\hbar}{\sigma_x\sqrt{2}}\right) = \frac{\hbar}{2}. \end{aligned} \tag{6.42}$$