Corrections to the Instructor’s Solution Manual
Introduction to Quantum Mechanics, 2nd ed.
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• page 16, Problem 2.5(a): in the first line, change $\Psi^2 \Psi$ to $\Psi^* \Psi$.

• page 23, Problem 2.13: move “(With $\psi_2$ in place . . . 2$\omega$.)” from the middle of part (c) to the end of part (b).

• page 25, Problem 2.17(d): in the first box, change $H_0$ to $H_1$; in the second box change $H_1$ to $H_2$; in the last line change $H_2$ to $H_3$.

• page 40, Problem 2.36: at the end of the paragraph starting “If $B = 0$”, change “$|A|^2/2 \Rightarrow A = \sqrt{2}$” to “$|A|^2a \Rightarrow A = 1/\sqrt{a}$”; at the end of the paragraph starting “If $A = 0$”, change “$|a|^2/2 \Rightarrow B = \sqrt{2}$” to “$|B|^2a \Rightarrow B = 1/\sqrt{a}$”.

• page 226-227, Problem 8.10. The statement of the problem has now been corrected (switching the signs in the exponents of the two terms in the first line of Eq. 8.52). Accordingly, the solution should be changed as follows:

$$\psi^{WKB}(x) = \begin{cases} \frac{1}{\sqrt{p(x)}} \left[ Ae^{-\frac{1}{\hbar} \int_0^x p(x') \, dx'} + Be^{\frac{1}{\hbar} \int_0^x p(x') \, dx'} \right] & (x < 0) \\ \frac{1}{\sqrt{p(x)}} \left[ Ce^{\frac{1}{\hbar} \int_0^x |p(x')| \, dx'} + De^{-\frac{1}{\hbar} \int_0^x |p(x')| \, dx'} \right] & (x > 0) \end{cases}$$

In overlap region 1, Eq. 8.43 becomes

$$\psi^{WKB} \approx \frac{1}{h^{1/2} \alpha^{3/4} (-x)^{1/4}} \left[ Ae^{-i\frac{\pi}{4} (-\alpha x)^{3/2}} + Be^{i\frac{\pi}{4} (-\alpha x)^{3/2}} \right],$$

$$A = \sqrt{\frac{\hbar \alpha}{\pi}} \left( \frac{ia + b}{2} \right) e^{-i\pi/4}; \quad B = \sqrt{\frac{\hbar \alpha}{\pi}} \left( \frac{-ia + b}{2} \right) e^{i\pi/4}. \quad \text{Putting in the expressions above for } a \text{ and } b : \quad A = \left( \frac{C}{2} + iD \right) e^{-i\pi/4}; \quad B = \left( \frac{C}{2} - iD \right) e^{i\pi/4}.$$
[In light of the Comment you might question the initial conditions. If the perturbation includes a factor \( \theta(t) \), are we sure this doesn’t alter \( c_a(0) \) and \( c_b(0) \)? That is, are we sure \( c_a(t) \) and \( c_b(t) \) are continuous at a step function potential? The answer is “yes”, for if we integrate Eq. 9.13 from \(-\epsilon\) to \(\epsilon\),

\[
c_a(\epsilon) - c_a(-\epsilon) = -\frac{i}{\hbar} H'_{ab} \int_{-\epsilon}^{\epsilon} e^{-i\omega_0 t} c_b(t) \, dt.
\]

But \(|c_b(t)| \leq 1\), so the integral goes to zero as \(\epsilon \to 0\), and hence \(c_a(-\epsilon) = c_a(\epsilon)\). The same goes for \(c_b\), of course.]