

**Corrections to the Instructor's Solution Manual  
Introduction to Quantum Mechanics, 2nd ed.**  
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- page 13, Problem 1.18(b), line 2, first inequality:  $\frac{h^2}{2mk_B} \rightarrow \frac{h^2}{3mk_B}$ .

- page 13, Problem 1.18(b): change lines 5 and 6 to read:

For atomic hydrogen ( $m = m_p = 1.7 \times 10^{-27}$  kg) with  $d = 0.01$  m:

$$T < \frac{(6.6 \times 10^{-34})^2}{3(1.7 \times 10^{-27})(1.4 \times 10^{-23})(10^{-2})^2} = \boxed{6.2 \times 10^{-14} \text{ K.}}$$

- page 15, Problem 2.2, line 6: “require”  $\rightarrow$  “require”.
- page 16, line 2:  $y^3/4$  should be  $y^2/4$ .
- page 16, Problem 2.5(a): in the first line, change  $\Psi^2\Psi$  to  $\Psi^*\Psi$ .
- page 20, bottom line, first integral:  $e^{-\xi^2/2} \rightarrow e^{-\xi^2}$ .
- page 21, line 2:  $e^{-\xi^2/2} \rightarrow e^{-\xi^2}$ .
- 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 31, Problem 2.27(b), line 2: “( $x < a$ )”  $\rightarrow$  “( $x > a$ )”.
- page 32, line 5: “( $x < a$ )”  $\rightarrow$  “( $x > a$ )”.
- page 40, Problem 2.36: at the end of the paragraph starting “If  $B = 0$ ”, change “ $|A|^2/2 \Rightarrow A = \sqrt{2}$ ” to “ $|A|^2 a \Rightarrow A = 1/\sqrt{a}$ ”; at the end of the paragraph starting “If  $A = 0$ ”, change “ $|a|^2/2 \Rightarrow B = \sqrt{2}$ ” to “ $|B|^2 a \Rightarrow B = 1/\sqrt{a}$ ”.
- page 65, Problem 3.8(b), remove the final sentence (“But notice ... one another.”).
- page 88, Problem 4.2(a), line 3, second term:  $\frac{d^2 X}{dy^2} \rightarrow \frac{d^2 Y}{dy^2}$ .
- page 95, Problem 4.11, line 3: “Eq. 4.15”  $\rightarrow$  “Eq. 4.74”.
- page 109, Problem 4.36 (a): after the second comma in the box, it should read “or 0 (probability 6/15).”
- page 112, Problem 4.40(a), line 3: “( $-i\delta_{ij}$ )”  $\rightarrow$  “( $-i\hbar\delta_{ij}$ )”.
- page 112, last line: change  $\langle T \rangle = \langle V \rangle$  to  $\langle T \rangle + \langle V \rangle$ .
- page 115, penultimate line: in the last two terms,  $\left(\frac{3a}{2}\right)^5 \rightarrow \left(\frac{3a}{2}\right)^s$ .

- page 116, Problem 4.44(a): remove  $\cos \theta$  in the middle term; Problem 4.44(c): change 4(5) to 3(4) and 11 to 3.
- page 125, top line: in the integral,  $\sin^2 \theta \rightarrow \sin \theta$ .
- page 169, box at bottom, line 2: " $\nu_3 - \nu_3$ "  $\rightarrow$  " $\nu_3 - \nu_2$ ".
- page 190, Problem 6.38, line 6: "(Eq. 6.98)"  $\rightarrow$  "(Eq. 6.93)".
- page 200, line 4, inside first integral:  $e^{2R/a} \rightarrow e^{2r/a}$ .
- 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:

$$\psi_{\text{WKB}}(x) = \begin{cases} \frac{1}{\sqrt{p(x)}} \left[ A e^{-\frac{i}{\hbar} \int_x^0 p(x') dx'} + B e^{\frac{i}{\hbar} \int_x^0 p(x') dx'} \right] & (x < 0) \\ \frac{1}{\sqrt{p(x)}} \left[ C e^{\frac{i}{\hbar} \int_0^x |p(x')| dx'} + D e^{-\frac{i}{\hbar} \int_0^x |p(x')| dx'} \right] & (x > 0) \end{cases}$$

...  
In overlap region 1, Eq. 8.43 becomes  $\psi_{\text{WKB}} \approx \frac{1}{\hbar^{1/2} \alpha^{3/4} (-x)^{1/4}} \left[ A e^{-i\frac{2}{3}(-\alpha x)^{3/2}} + B e^{i\frac{2}{3}(-\alpha x)^{3/2}} \right]$ ,  
 ...

$$A = \sqrt{\frac{\hbar \alpha}{\pi}} \left( \frac{ia + b}{2} \right) e^{-i\pi/4}, \quad B = \sqrt{\frac{\hbar \alpha}{\pi}} \left( \frac{-ia + b}{2} \right) e^{i\pi/4}. \quad \text{Putting in the expressions above for } a \text{ and } b :$$

$$A = \left( \frac{C}{2} + iD \right) e^{-i\pi/4}, \quad B = \left( \frac{C}{2} - iD \right) e^{i\pi/4}.$$

$$A = \left( \frac{C}{2} + iD \right) e^{-i\pi/4} = \left( \frac{i}{4} e^{-\gamma} e^{-i\pi/4} F + i e^{\gamma} e^{-i\pi/4} F \right) e^{-i\pi/4} = \left( \frac{e^{-\gamma}}{4} + e^{\gamma} \right) F.$$

$$T = \left| \frac{F}{A} \right|^2 = \frac{1}{(e^{\gamma} + \frac{e^{-\gamma}}{4})^2} = \boxed{\frac{e^{-2\gamma}}{[1 + (e^{-2\gamma}/4)]^2}}.$$

- ...
- page 229, Problem 8.13, line 4:  $e^{-e} \rightarrow e^{-x}$ .
  - page 236, Problem 9.1, line 3, last expression:  $e^{r/2a} \rightarrow e^{-r/2a}$ .
  - page 236, Problem 9.1, last three lines: remove the minus signs in front of all 6 expressions.
  - page 237, end of Problem 9.2, add the following:

[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  $\epsilon$ ,

$$c_a(\epsilon) - c_a(-\epsilon) = -\frac{i}{\hbar} H'_{ab} \int_0^\epsilon e^{-i\omega_0 t} c_b(t) dt.$$

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

- page 244, line 5:  $\left[\frac{2a}{3}\right]^5 \rightarrow \left(\frac{2a}{3}\right)^5$ .
- page 245, line 5: insert “ $2i\hbar$ ” right after “{”.
- page 250, Problem 9.18, line 4:  $\left(\frac{4V_0}{3\pi}\right) \rightarrow \left(\frac{4V_0}{3\pi}\right)^2$ .
- page 250, Problem 9.20(b), line 2, last term:  $\begin{pmatrix} B_0 a & B_{\text{rf}} e^{i\omega t} b \\ B_{\text{rf}} e^{-i\omega t} a & -B_0 b \end{pmatrix} \rightarrow \begin{pmatrix} B_0 a + B_{\text{rf}} e^{i\omega t} b \\ B_{\text{rf}} e^{-i\omega t} a - B_0 b \end{pmatrix}$ .
- page 256, in the first box: “ $T_e a/v$ ”  $\rightarrow$  “ $T_e = a/v$ ”.
- page 271, line beginning “(1)  $\psi$  continuous”:  $\text{sin}ka \rightarrow \sin ka$ .