Corrections to Homework Solutions

HW #7 Ferry #4

$$H'_{n3} = \begin{cases} \frac{24eEan}{\pi^2(9-n^2)^2}(-1)^{n/2} & n \text{ even} \\ 0 & n \text{ odd} \end{cases}$$

This changes the final result to

$$P_{3\to n} = \begin{cases} \left(\frac{96eEa^3n}{(9-n^2)^2\hbar^2\pi^4}\sin\left(\frac{\hbar\pi^2T}{4ma^2}(9-n^2)\right)\right)^2 & n \text{ even} \\ 0 & n \text{ odd} \end{cases}$$

Homework #9 Liboff 14.7

$f(\theta) = \frac{2mV_0}{\hbar^2 k}\int_0^\infty dr\, r\sin(kr)\, e^{-r^2/a^2}$ as in the PDF solution,

but we have to go further:

$$\sigma = \int_0^{2\pi} d\phi \int_0^\pi \sin\theta\, d\theta \left| \frac{2mV_0}{\hbar^2 k}\int_0^\infty dr\, r\sin(kr)\, e^{-r^2/a^2}\right|^2$$

Homework #10 From Class

$$f_{\vec{k}}(\vec{r}) = -\frac{m}{2\pi\hbar^2}\int d^3\vec{r}'\, e^{-ik\hat{r}\cdot\vec{r}'} V(\vec{r}')\,\psi_{\vec{k}}(\vec{r}')$$

$$= -\frac{m}{2\pi\hbar^2}\int d^3\vec{r}'\, e^{-ik\hat{r}\cdot\vec{r}'} V(\vec{r}')\left[e^{ik\hat{k}\cdot\vec{r}'} + f_{\vec{k}}(\vec{r}')\,\frac{e^{ikr'}}{r'}\right]$$

Now, assuming V is weak, we can drop $f_{\vec{k}}\frac{e^{ikr'}}{r'}$ term from inside the integral since it contains another factor of V from our equation for $f_{\vec{k}}$. Then, using that $\vec{k} = k\hat{r}$, we get our result:

$$f_{\vec{k}}(\vec{r}) = -\frac{m}{2\pi\hbar^2}\int d^3\vec{r}'\, e^{ik\hat{r}\cdot(\vec{r}-\vec{r}')} V(\vec{r}').$$

Homework #11 Saxon 9

(d) $\left.\frac{d\sigma}{d\Omega}\right|_{\theta=\frac{\pi}{2}} = 11.3\times10^{-31}\ m^2 = 11.3\times10^{-27}\ cm^2$

→ # neutrons scattered into given region per second = 4.4