4.42 continued

$$g = \frac{1}{2}\int_{-1}^{1} du\, P(u)\, u\, du = \frac{1}{2}(a-b)$$

note $P(u) = a\,\delta(u-\pi/2) + b\,\delta(u+\pi/2)$
(if you are familiar with Dirac Delta functions)

$a = g-1$
$b = g+1$

Scattering backwards

$$\frac{\omega_0}{2}\int_{0}^{\pi/2} P(u)\, I(u,\tau)\, du$$

$$= \frac{\omega_0}{2}(g-1)\,\alpha\, I = \underbrace{\omega_0\left(\frac{g-1}{2}\right)(1-e^{-\tau})}_{b} I$$

Scattering forwards

$$\frac{\omega_0}{2}\int_{-\pi/2}^{\pi/2} P(u)\, I(u,\tau)\, du$$

$$= \frac{\omega_0}{2}(g+1)\,\alpha\, I = \underbrace{\omega_0\left(\frac{g+1}{2}\right)(1-e^{-\tau})}_{f} I$$

(b) absorbed $\alpha = 1-e^{-\tau}$

(c) I'm not enjoying this anymore & it is the wrong problem anyway