Answers for HW assignment 6

/1/ Exercise 11.12. the standing wave solution is equal to
C/2 cos(kz - ωt) + C2/ cos(kz + ωt); i.e., a superposition of traveling waves traveling in opposite directions.
2 points

/2/ Exercise 11.15. The transmitted light wave is
$E(x,t) = E_0 \cos\theta \cos(kx - \omega t)$ **p** where **p** is the polarization direction, which is at angle θ with respect to the initial polarization direction.
Then $I/I_o = \cos^2(\theta) = 0.2$; implies θ = 63.4 deg.
2 points

/3/ Exercise 11.18. (A) $\langle \mathbf{S} \rangle = \mathbf{k}\,(C_1^2+C_2^2)/\mu_0 c$.
(B) The vector E(t) revolves around the z axis as a function of time.
(C) the vector E(z) revolves around the z axis as a function of z.
6 points

/4/ Exercise 11.19. (B) **E** is a Gaussian wave packet polarized in the y direction; **B** is a Gaussian wave packet polarized in the z direction. Show a picture in 3 dimensions.
4 points

/5/ Exercise 11.24. Forces on a dust grain in orbit around the sun.
Estimate $F_{radiation} \sim 4 \times 10^{-18}$ N and $F_{gravitation} \sim 3 \times 10^{-17}$ N. The radiation force is smaller than the gravitational force but not much smaller, so the radiation force will affect the orbit of the dust grain.
2 points

/6/ Exercise 11-28. (A) $dP/d\Omega = k\ \omega /(2\ \mu_0)\ C^2 \sin^2(\theta)$
(B) $P(80 < \theta < 100 \text{ deg}) / P_{total} = 0.26$.
4 points