Yichao Yu
8.311 Problem Set 8
Recitation Section 1

1.

$$
\begin{aligned}
S_{1,0} =& \frac{1}{2}\frac{\omega k a^2 \mu}{\pi^2} H_0^2 \sin^2 \frac{\pi x}{a} \\
P_{1,0} =& \frac{1}{4}\frac{\omega k a^3 b \mu}{\pi^2} H_0^2 \\
-\frac{\mathrm{d}P}{\mathrm{d}z} =& \frac{1}{2\sigma\delta}\int \left|\vec{n}\times\vec{H}\right|^2 \mathrm{d}l \\
=& \frac{H_0^2}{4\sigma\delta}\left(2b + a + \frac{k^2 a^3}{\pi^2}\right) \\
\beta_{1,0} =& \frac{\pi^2}{2\mu_0 k a^3 b\sqrt{2\mu_c\sigma\omega}}\left(2b + a + \frac{k^2 a^3}{\pi^2}\right) \\
=& \frac{\pi^2}{2\mu_0 a^3 b\sqrt{2\mu_c\mu\varepsilon\sigma\omega\left(\omega^2 - \omega_{1,0}^2\right)}}\left(2b + a + \frac{\mu\varepsilon\left(\omega^2 - \omega_{1,0}^2\right)a^3}{\pi^2}\right)
\end{aligned}
$$

2.

3.