$$f(z) = \cos(z) + \beta \frac{\sin(z)}{z} \tag{5.73}$$

For the bottom of the band, find z such that

$$1 = \cos(z) + 10\frac{\sin(z)}{z}, \quad 0 < z < \pi$$

The result is

$$z = 2.628$$

From $\beta = m\alpha a/\hbar^2$ and $\alpha/a = 1\,\mathrm{eV}$ we have

$$a^2 = a\frac{10\hbar^2}{m\alpha} = \frac{10\hbar^2}{m}\,\mathrm{eV}^{-1}$$

From $z = ka$ and $k = \sqrt{2mE}/\hbar$ we have

$$z = \frac{\sqrt{2mE}}{\hbar}a$$

Hence

$$E = \frac{z^2\hbar^2}{2ma^2}$$

Substitute for a^2

$$E = \frac{z^2}{20} = 0.345\,\mathrm{eV}$$