

38. (a) We imagine dividing the one-turn solenoid into  $N$  small circular loops placed along the width  $W$  of the copper strip. Each loop carries a current  $\Delta i = i/N$ . Then the magnetic field inside the solenoid is  $B = \mu_0 n \Delta i = \mu_0 (N/W)(i/N) = \mu_0 i/W$ .

(b) Eq. 31-35 leads to

$$L = \frac{\Phi_B}{i} = \frac{\pi R^2 B}{i} = \frac{\pi R^2 (\mu_0 i/W)}{i} = \frac{\pi \mu_0 R^2}{W} .$$