

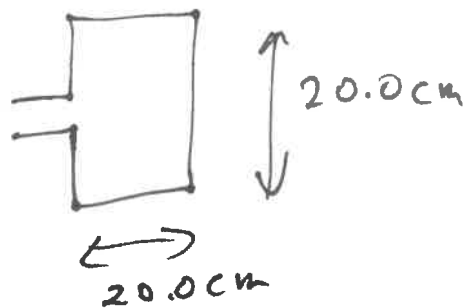
Ch. 11 Prob. 42

$$N = 200 \text{ turns}$$

$$l = 20.0 \text{ cm}$$

$$\tau = 300 \text{ N}\cdot\text{m}$$

$$I = 25.0 \text{ A}$$



$$\vec{\tau} = N I \vec{A} \times \vec{B}$$

The magnitude of torque is
 $\tau = N I A B \sin \theta$

The maximum torque is

$$\tau = N I A B$$

$$A = l^2, \text{ so } \tau = N I l^2 B$$

Solve for the magnetic field strength

$$B = \frac{\tau}{N I l^2} = \frac{300 \text{ N}\cdot\text{m}}{(200)(25.0 \text{ A})(0.20 \text{ m})^2}$$

$$B = 1.5 \text{ T}$$