

FOURTH MIDTERM

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Discussion Instructor (circle): Gramada Hansen Li Zhukov

Discussion Section # \_\_\_\_\_

AV = 11

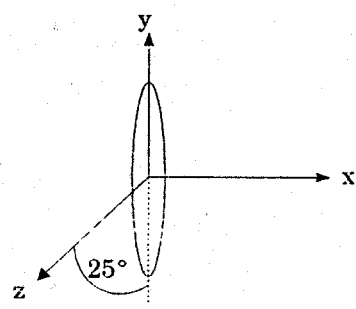
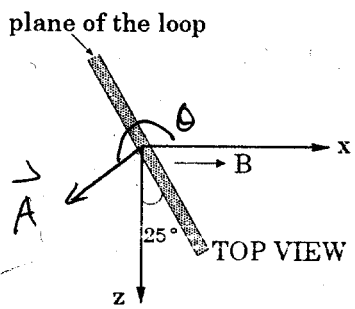
**SHOW ALL WORK!!!!**

**REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!**

**Use the conversion constants and data given on the front page.**

A circular coil of wire with 175 turns and a radius of 1.75 cm is suspended in a horizontal magnetic field. The magnetic field is in the positive x-direction. The current in the coil is 0.750 A.

- 1013 (a) Calculate the magnitude of the torque on the coil.
- 6 (b) Find the magnitude of the magnetic moment of the coil.
- 6 (c) In the top view shown, the torque is observed to move the coil in a counterclockwise direction. What is the direction of  $\vec{A}$ ? Express this as an angle measured counterclockwise from the positive x-direction.



(a) Torque =  $|\vec{\mu} \times \vec{B}| = \mu B \sin \theta$  -5  
 $= N I A B \sin 25^\circ = B \times 175 \times 0.75 \times \pi \times (0.0175)^2 \cdot \sin 25^\circ$   
 $= 0.0534 B \text{ (N}\cdot\text{m)}$

(b)  $\mu = N \cdot I \cdot A = 175 \times 0.75 \times \pi \times (0.0175)^2 = 0.126 \text{ (A}\cdot\text{m}^2)$

(c)  $\theta = 180^\circ + 25^\circ = 205^\circ$