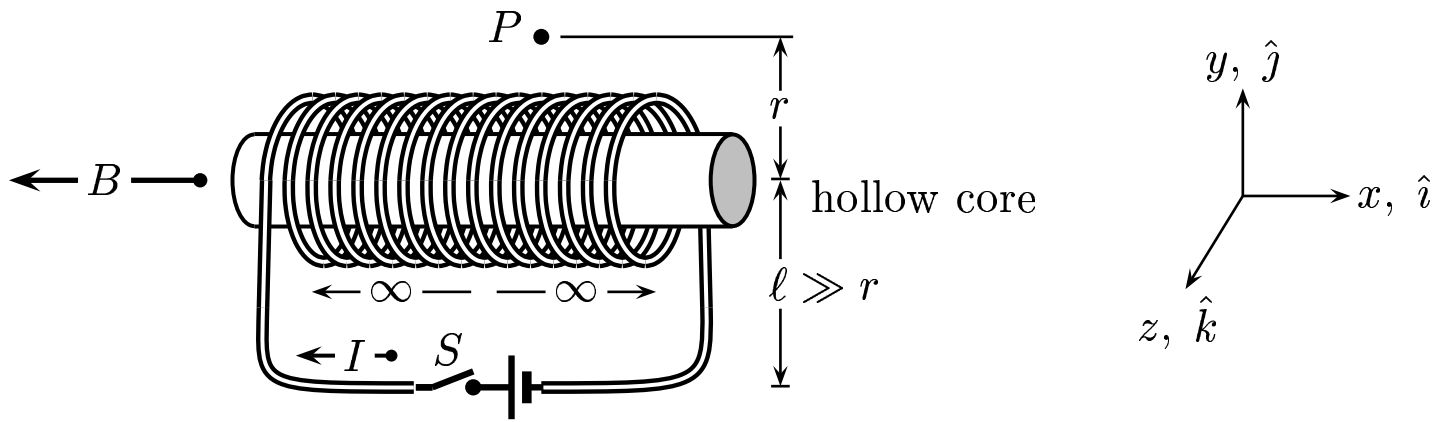


Strictly speaking  $\vec{B}$  outside of an infinitely-long, tightly-wound, perfect solenoid is not exactly zero.



Find the direction of  $\vec{B}$  at point  $P$ ,  $OP = r$ .

- A) The direction of  $\vec{B}_p$  is  $+\hat{i}$ .
- B) The direction of  $\vec{B}_p$  is  $-\hat{i}$ .
- C) The direction of  $\vec{B}_p$  is  $+\hat{k}$ .
- D) The direction of  $\vec{B}_p$  is  $-\hat{k}$ .

Current from left to right is  $I$ . Applying the right-hand-rule for a long wire, one finds that at  $P$ ,  $\vec{B}$  is along  $\hat{k}$ .

Answer **C**.

The above answer assumes that the current segment containing the battery and the switch is far away from the coil. If this is not the case, the current loop in the coil acts like a dipole and the return path of the magnetic field from infinity is in the  $\hat{i}$  direction.