

1. (a) Since the field lines of a bar magnet point towards its South pole, then the \vec{B} arrows in one's sketch should point generally towards the left and also towards the central axis.
- (b) The sign of $\vec{B} \cdot d\vec{A}$ for every $d\vec{A}$ on the side of the paper cylinder is negative.
- (c) No, because Gauss' law for magnetism applies to an *enclosed* surface only. In fact, if we include the top and bottom of the cylinder to form an enclosed surface S then $\oint_S \vec{B} \cdot d\vec{A} = 0$ will be valid, as the flux through the open end of the cylinder near the magnet is positive.