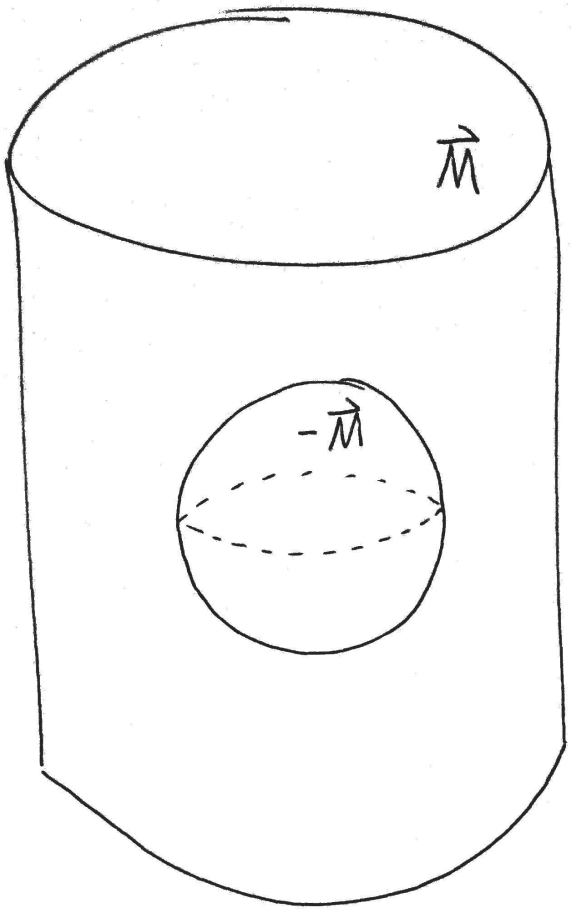

Field from dipoles outside sphere equal to field from large magnetic slab (cylinder) minus a sphere of opposite magnetisation

$$\vec{B}_{sphere} = -\frac{2}{3}\mu_0 \vec{M}$$

$$\vec{B}_{bulk} = \mu_0(\vec{H} + \vec{M}) = \mu_0 \vec{M}$$ assuming needle domains, so $H=0$

$$\vec{B}_{cavity} = \frac{1}{3}\mu_0 \vec{M}$$