38. (a) Since $i = i_d$ (Eq. 32-39) then the portion of displacement current enclosed is

$$i_{d,\text{enc}} = i\,\frac{\pi\left(\frac{R}{3}\right)^2}{\pi R^2} = i\,\frac{1}{9} = 1.33 \text{ A} .$$

(b) We see from Sample Problems 32-3 and 32-4 that the maximum field is at $r = R$ and that (in the interior) the field is simply proportional to r. Therefore,

$$\frac{B}{B_{\text{max}}} = \frac{3.00 \text{ mT}}{12.0 \text{ mT}} = \frac{r}{R}$$

which yields $r = R/4$ as a solution. We now look for a solution in the exterior region, where the field is inversely proportional to r (by Eq. 32-41):

$$\frac{B}{B_{\text{max}}} = \frac{3.00 \text{ mT}}{12.0 \text{ mT}} = \frac{R}{r}$$

which yields $r = 4R$ as a solution.