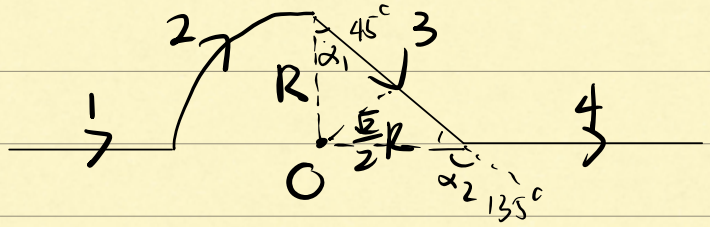
1. 一根无限长导线弯成如图形状，设导线都处于同一平面内，其中第2段是半径为R的1/4圆弧，其余部分为直线，导线中通有电流I，求图中O点处磁感应强度



$B_{1O} = B_{4O} = 0$

$B_{2O} = \frac{\mu_0 I}{2R} \cdot \frac{\theta}{2\pi}$

$= \frac{\mu_0 I}{2R} \cdot \frac{\pi}{4\pi}$

$= \frac{\mu_0 I}{8R}$ ⊗

$B_{3O} = \frac{\mu_0 I}{4\pi x}(\cos\alpha_1 - \cos\alpha_2)$ $\quad x = \frac{\sqrt{2}}{2}R$

$= \frac{\sqrt{2}\mu_0 I}{2\pi R}(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2})$

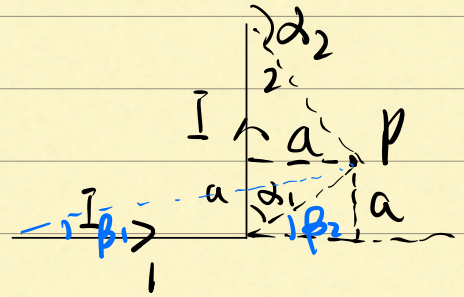
$= \frac{\mu_0 I}{2\pi R}$ ⊗

$B = B_{2O} + B_{3O}$

$= \frac{\mu_0 I}{8R} + \frac{\mu_0 I}{2\pi R}$

$= \frac{\mu_0 I}{2R}(\frac{1}{4} + \frac{1}{\pi})$ ⊗

2. 一无限长载有电流I的直导线在一处折成直角，P点位于导线所在平面内，距一条折线的延长线和另一条导线的距离都为a，求P点的磁感强度



$$B_{P1} = \frac{\mu_0 I}{4\pi x}(\cos\beta_1 - \cos\beta_2)$$
$$= \frac{\mu_0 I}{4\pi a}\left(1 - \frac{\sqrt{2}}{2}\right)$$
$$= \frac{\mu_0 I}{4\pi a}\left(\frac{2-\sqrt{2}}{2}\right)$$
$$= \frac{\mu_0 I(2-\sqrt{2})}{8\pi a} \quad \odot$$

$$B_{P2} = \frac{\mu_0 I}{4\pi x}(\cos\alpha_1 - \cos\alpha_2)$$
$$= \frac{\mu_0 I}{4\pi a}\left(\frac{\sqrt{2}}{2} + 1\right)$$
$$= \frac{\mu_0 I(\sqrt{2}+2)}{8\pi a} \quad \otimes$$

以向里方向为正方向

$$B = B_{P1} - B_{P2} = \frac{2\sqrt{2}\mu_0 I}{8\pi a} = \frac{\sqrt{2}\mu_0 I}{4\pi a} \quad \otimes$$