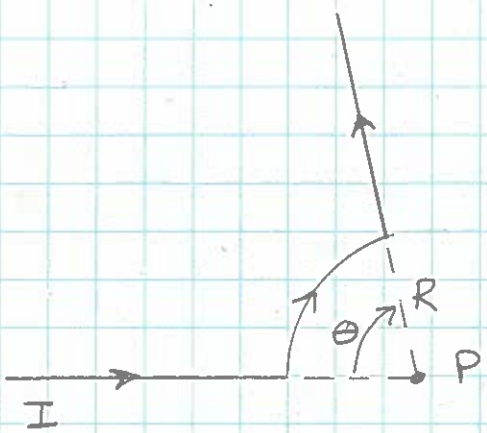


$$d\vec{B} = \frac{\mu_0}{4\pi}\frac{I\,d\vec{s}\times\hat{r}}{r^2}$$

for $d\vec{s}$ in either of the straight wire segments:

$$d\vec{s}\times\hat{r} = 0$$

So, only the circular arc segment produces any field at P

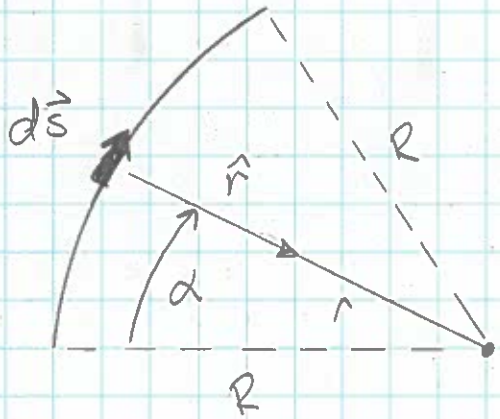
for all $d\vec{s}$:

$r = R$

$$I\,d\vec{s}\times\hat{r} = I\,ds|\hat{r}|\sin 90^\circ = I\,ds$$

and,

$$ds = R\,d\alpha$$



So: $$dB = \frac{\mu_0}{4\pi}\frac{I\,R\,d\alpha}{R^2}$$

Direction: for all $d\vec{s}$, $d\vec{s}\times\hat{r}$ is <u>into</u> the page.

$$B = \int_{wire} dB = \frac{\mu_0 I}{4\pi R}\int_0^\theta d\alpha$$

$$= \frac{\mu_0 I}{4\pi R}\alpha\Big|_0^\theta \Rightarrow B = \frac{\mu_0 I\theta}{4\pi R}$$

Direction is into the page.