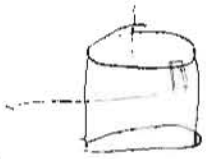
11510

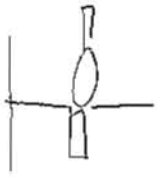
Review

$\pi \int_a^b (\text{radius})^2 \, (ht) \, \frac{dy}{dx}$



Shell:

$2\pi \int_a^b (\text{radius})(ht) \, \frac{dy}{dx}$ thickness



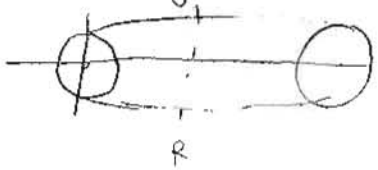
$\pi \int_a^b (R^2 - r^2) \, \frac{dy}{dx}$

Taurus

$$2\pi \int_{-r}^{r} (R-x)(2y)\,dx$$

$$4\pi \int_{-r}^{r} (R-x)\left(\sqrt{r^2-x^2}\right)dx$$

- revolving circle



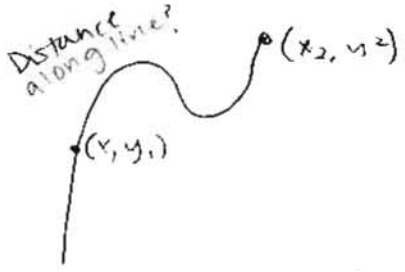
R

$$4\pi R \int_{-r}^{r} \sqrt{r^2-x^2} - 4\pi \int_{-r}^{r} x\sqrt{r^2-x^2}\,dx$$ ← odd function

$$4\pi R\left(\tfrac{1}{2}\pi r^2\right) - 4\pi \int_{-r}^{r} x\sqrt{r^2-x^2}\,dx$$ ↙

$$4\pi R\left(\tfrac{1}{2}\pi r^2\right) - 0$$

Distance along line?



$$\sum_{i=1}^{N} \sqrt{(x_i - x_{i-1})^2 + (y_i - y_{i-1})^2}$$ ← Not Riemann sum b/c need change

$$\lim_{\|\Delta\| \to} = \sum_{i=1}^{N} \sqrt{(\Delta x_i)^2 + (\Delta y_i)^2}$$

$$= \sum_{i=1}^{N} \sqrt{1 + \left(\frac{\Delta y_i}{\Delta x_i}\right)^2}\,\Delta x_i$$

$$= \int_a^b \sqrt{1 + [f'(x)]^2}\,dx$$