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Tugas 2 KVT Integral

1. Luas permukaan dari:
$x = \sqrt{4-y}$
$a = 0$, $b = 15/4$

$$\Rightarrow L_P = \int_a^b 2\pi x \sqrt{1+\left(\frac{dx}{dy}\right)^2}\, dy$$

$$= \int_0^{15/4} 2\pi\sqrt{4-y}\sqrt{1+\left(\frac{d\sqrt{4-y}}{dy}\right)^2}\, dy$$

$$= \int_0^{15/4} 2\pi\sqrt{4-y}\sqrt{1+\left(\frac{-1}{2\sqrt{4-y}}\right)^2}\, dy$$

$$= \int_0^{15/4} 2\pi\sqrt{4-y}\sqrt{1+\frac{1}{16-4y}}\, dy$$

$$= \int_0^{15/4} 2\pi\sqrt{4-y}\sqrt{\frac{17-4y}{16-4y}}\, dy$$

$$= \frac{2\pi}{2}\int_0^{15/4}\sqrt{17-4y}\, dy \qquad = \pi\int_0^{15/4}\sqrt{v}\,\frac{dv}{-4}$$

$$= \frac{\pi}{-4}\int_0^{15/4}\sqrt{v}\, dv = \frac{-\pi}{4}\left(v^{3/2}\cdot\frac{2}{3}\Big|_0^{15/4}\right)$$

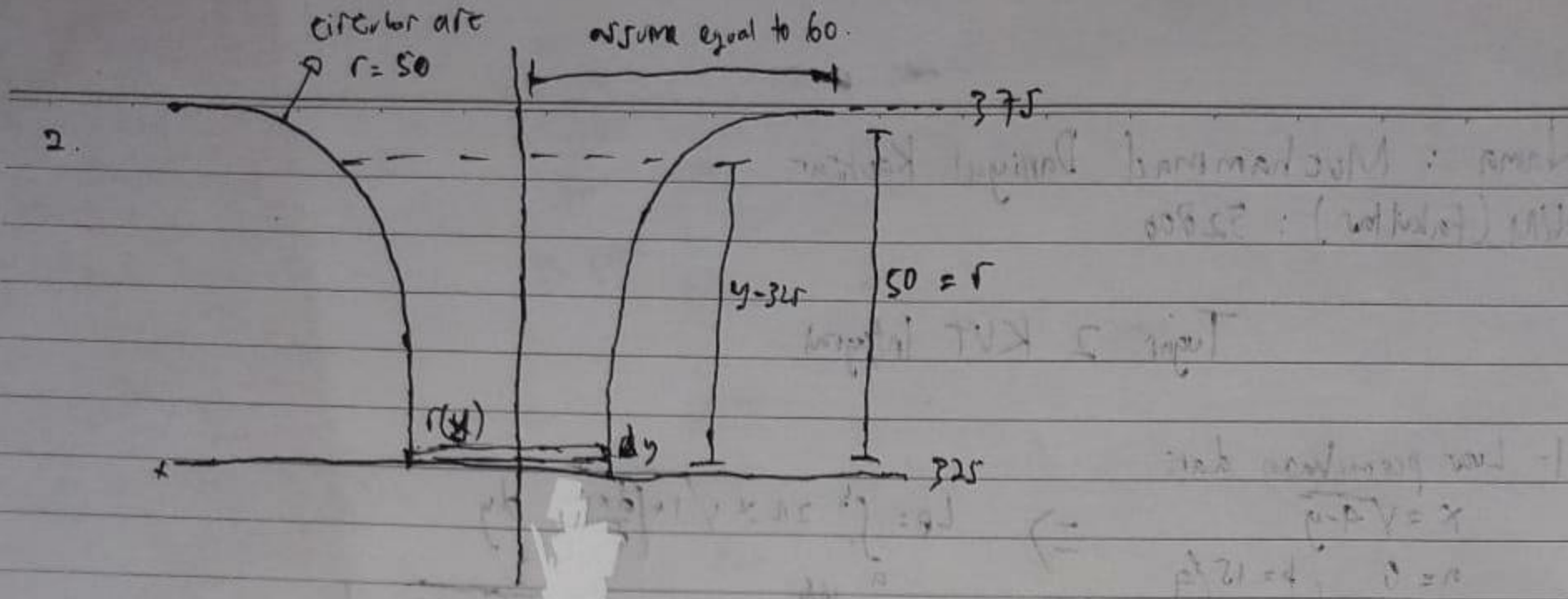
$$= \frac{-\pi}{4}\left((17-4y)^{3/2}\cdot\frac{2}{3}\Big|_0^{15/4}\right)$$

$$= \frac{-\pi}{4}\left((17-15)^{3/2}\cdot\frac{2}{3} - (17)^{3/2}\cdot\frac{2}{3}\right)$$

$$= \frac{-\pi}{4}\cdot\frac{2}{3}\left(2\sqrt{2} - 17\sqrt{17}\right)$$

$$= \frac{17\sqrt{17}\pi - 2\sqrt{2}\pi}{6}$$

2.



$$r(y) = 60 - \sqrt{r^2 - (y-325)^2} = 60 - \sqrt{50^2 - (y-35)^2}$$

Usaha = massa jenis air × jarak × volume

$W = \rho \times s \times V$

$= \rho \cdot (375 - y)\, \pi\, (r(y))^2\, dy$

$$W = \int_{325}^{375} \rho\, (375-y)\, \pi \left(60 - \sqrt{50^2 - (y-325)^2}\right)^2 dy$$

$$= \rho\pi \int_{325}^{375} (375-y) \cdot \left(60 - \sqrt{50^2 - (y-325)^2}\right)^2 dy$$

$= \rho\pi \cdot 18492$