

圖 首本大学 数学作业纸

班级: 计 23 姓名: \$P 东麻编号:2022010799 科目: Calculus (1)第

A1.

Sol. Volume =
$$2\int_{0}^{A} \left[\pi(b+\sqrt{a^{2}-y^{2}})^{2} - \pi(b-\sqrt{a^{2}-y^{2}})^{2}\right] dy$$

= $2\pi\int_{0}^{A} 4b\sqrt{a^{2}-y^{2}} dy$

= $8b\pi\int_{0}^{\frac{\pi}{2}} \sqrt{a^{2}} \frac{a^{2}\sin^{2}\theta}{a\sin^{2}\theta} da\sin^{2}\theta$

= $8b\pi\int_{0}^{\frac{\pi}{2}} a^{2}\cos^{2}\theta d\theta$

= $8a^{2}b\pi\int_{0}^{\frac{\pi}{2}} \left(-\frac{1}{2} + \frac{\cos^{2}\theta}{2}\right) d\theta$

= $8a^{2}b\pi\left(\int_{0}^{\frac{\pi}{2}} \frac{1}{2}d\theta + \int_{0}^{\frac{\pi}{2}} \frac{\cos^{2}\theta}{4} d\theta\right)$

= $8a^{2}b\pi\left(\int_{0}^{\frac{\pi}{2}} \frac{1}{2}d\theta + \int_{0}^{\frac{\pi}{2}} \frac{\cos^{2}\theta}{4} d\theta\right)$

= $8a^{2}b\pi\left(-\frac{\pi}{4} + \theta\right)$

= $2a^{2}b\pi^{2}$

Pf.
$$N = \int R^2 - x^2$$
, $N' = \frac{1}{2} \cdot \frac{-2x}{\int R^2 - x^2} = \frac{-x}{\int R^2 - x^2}$

$$S = \int_{a}^{a+h} 2\pi \int R^2 - x^2 \int 1 + \left(\frac{dy}{dx}\right)^2 \cdot dx$$

$$= 2\pi \int_{a}^{a+h} \int R^2 - x^2 \cdot \int 1 + \frac{x^2}{R^2 - x^2} dx$$

$$= 2\pi \int_{a}^{a+h} \int R^2 - x^2 + x^2 dx$$

$$= 2\pi \left(|Rx| \right) \int_{a}^{a+h}$$

$$= 2Rh \pi$$



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so the graph of ex is concave up

$$S_{ABCD} = \frac{1}{2}C_{AB} + C_{D} \cdot AD$$

= $e^{(\ln \alpha + \ln b)/2} (\ln b - \ln \alpha)$

C) Pf.
$$\int \ln b \, e^x \, dx = \frac{e^x}{\ln a} = b - a$$
.

Thus, by (b), we have

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A4. Sol. lim xx = limexinx = expt inx = e 15m - 1/2 $= e^{x \rightarrow ot}(-x)$ =e° = 1 AI. Pf. Sec'x = sec' sec sec'x = sect sec(II - sect x) =T-Sec-1x. BI. For C Pf. FOR WINE C: L= Sasifíty]2+ [g'(t)]2 dt FOR curve c': L'= Sc [[veinsfice(n)]]+[vicusoice(n))] de = [d &cu) [f'cecus] + [d'cecus] du = Sa (If'cocn) f+ [g'cocn)] 2 docu)

= [a [f'(t]]+jg'(t]] dt = L

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Pf. Suppose f is not monotonic.

candition D: there exist a, b, c s.t.

a = b = c and francfib), frb> frc). So there exists k sit frank k = frb) free = k < frb)

According to Intermediate value Theorem, there exist x. . x = s.t x. E. (a.b), f(x)=1e Xz E(b.c), f(xz)=k

Thus lead to contradiction.

condition (2): there exist a.b.c s.t.

achec and flas >flbs and flbs efles.

so there exists k s.t flas>k>flbs fcc>>k>flb)

According to Intermediate value Theorem, there exist x1, x2 s.t. x1 Glails > flx1)=k

- x2 G (b, c) flx2)=k

Thus lead to contradiction. By DE, f must be monotonic