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AI.

a). U=fx110x +fx2)0x+11+fx110x since f is increasing ON Ea, b]

L=flx) Dx+flx, Dxx+ 111+flxn-) Dx since f is increasing on Earb].

50 U-L = f(xn) Dx - f(x0) Dx = (f(b)-f(a)) DX

b) Since f is increacing on Earb]. U=flxi) Dxi + flxz) Dxz+111 + flxn) Dxn L=f(x) Ax, + f(x) Axz+ ... + f(x,) axn

>U-L=(f(x,)-f(x))0x,+(f(x2)-f(x,))0x2+ (1+(f(xn)-f(xn-1))0xn (f (x1)-f(x0)) △xmax + (f(x0)-f(x1)) √xmax + (1) + (f(xn)-f(xn-1)) = H(1) -f(a)) Oxmax

= If(b) - f(a)(1 xmax

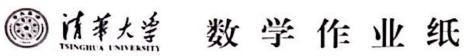
This lim (U-L) = lim (fcb)-f(a))0×max = 0 since DXmax = 11P11.

A2.

as True = n'ux = fix), hux) is twice-differentiable for all x since f(x) is differentiable for all x. b) True: they are both continuous since they are both differentiable

c) True: h'un=fun=0.

d) True: 1/41)=0 & K"(1)=f'(1)<0



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e) False: h"(1) = f'(1) < 0

f) take: h'(x)=f(x)=0. the sign never changes.

go True: N'(x) is decreasing cince f'(x)<0. and

· Will = fin) = 0, so him crosses the x-axis at x=1

A3. Sol. Junto do

$$\int \frac{10 \cos 10}{\cos 10} = \left(\frac{10 \cos 10}{\cos 10}\right) = \left(\frac{10 \cos 10}{\cos 10}\right) = \left(\frac{10 \cos 10}{\cos 10}\right) = \left(\frac{10 \cos 10}{\cos 10}\right)$$

$$= \int \frac{10 \cos 10}{\cos 10} \cdot \frac{\cos 10}{\cos 10} \cdot \frac{\cos 10}{\cos 10}$$

A4.

since y >0, the intersection of two lines

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$$3-y = 2\sqrt{3} \implies 9-6y+y^2 = 4y$$

$$\implies y^2 - 10y + 9 = 0$$

$$\implies (y - 9)(y - 1) = 0$$

$$\implies y_1 = 9, y_2 = 1$$

Since x >0. The intersection of the two lines

area =
$$\int_{0}^{1} 2Jy \, dy + \int_{0}^{2} \left[(3-y) - (y-1)^{2} \right] dy$$

= $\frac{4}{5}y^{\frac{3}{2}} \left[(3-y) - (y-1)^{2} \right] dy$
= $\frac{4}{5}y^{\frac{3}{2}} \left[(3-y) - (y-1)^{2} \right] dy$
= $\frac{4}{5}y^{\frac{3}{2}} \left[(3-y) - (y-1)^{2} \right] dy$
= $\frac{4}{5}y^{\frac{3}{2}} \left[(3-y) - (y-1)^{2} \right] dy$

ZA.

$$I = \int_{0}^{q} \frac{f w dx}{f w + f (a \times x)} = \int_{a}^{0} \frac{-f (a - u) du}{f (a - u) + f (u)} = \int_{0}^{a} \frac{f (a - x) dx}{f (a - x) + f (u)}$$
Thus
$$I = \frac{1}{2} \int_{0}^{a} \frac{f (x) dx}{f (x) + f (a - x)} + \frac{1}{2} \int_{0}^{a} \frac{f (a - x) dx}{f (x) + f (a - x)}$$

$$= \frac{1}{2} \int_{0}^{a} \frac{f (x) + f (a - x)}{f (x) + f (a - x)} \cdot dx$$

$$= \frac{1}{2} \int_{0}^{a} 1 \cdot dx$$

$$= \frac{1}{2} (x) \Big|_{0}^{a}$$

$$= \frac{q}{2}$$

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B1.

Sol. the derivative of the left side:

$$\frac{d}{dx}(\int_{0}^{x}(\int_{0}^{u}f(t)dt)du)=\int_{0}^{x}f(t)dt$$

the derivative of the right side:

When 7=0, both side must be 0, so the constant must be 0.