Good afternoon:
Warm up

Let $f(x) = \int_{-1}^{2x} \frac{1}{4} t^3 \, dt$ **Find $f'(4)$ and $f''(4)$**

$f'(x) = \frac{1}{4}(2x)^3 \cdot 2$

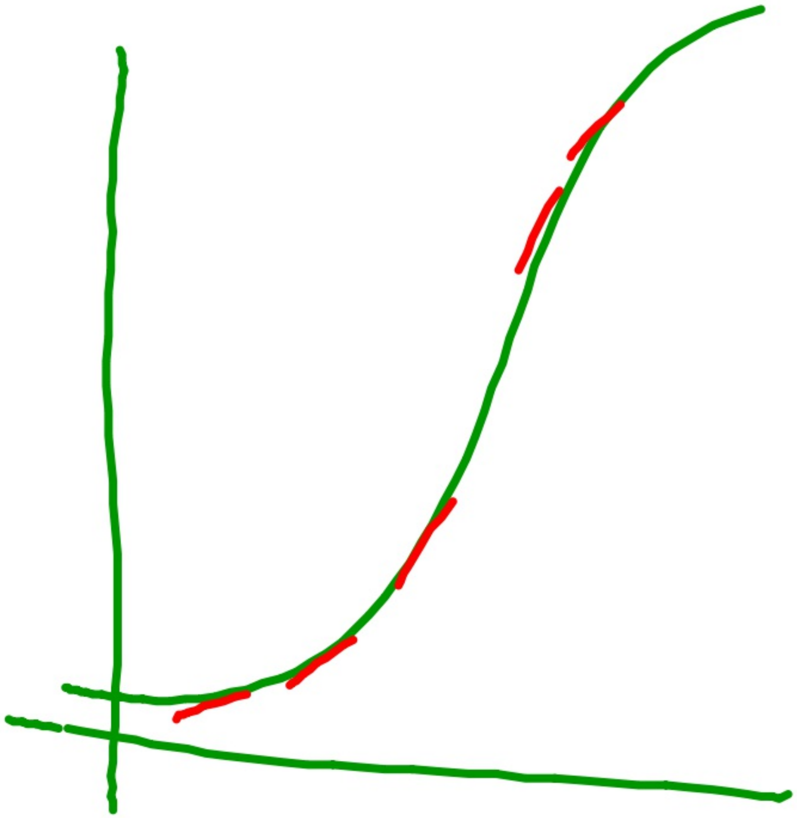
$\frac{1}{\cancel{4}} \overset{2}{\cancel{8}} x^3 \cdot 2$

$\Rightarrow f'(x) = 4x^3$

$f'(4) = 4(4)^3 = 4^4 = 2^8 = \underline{256}$

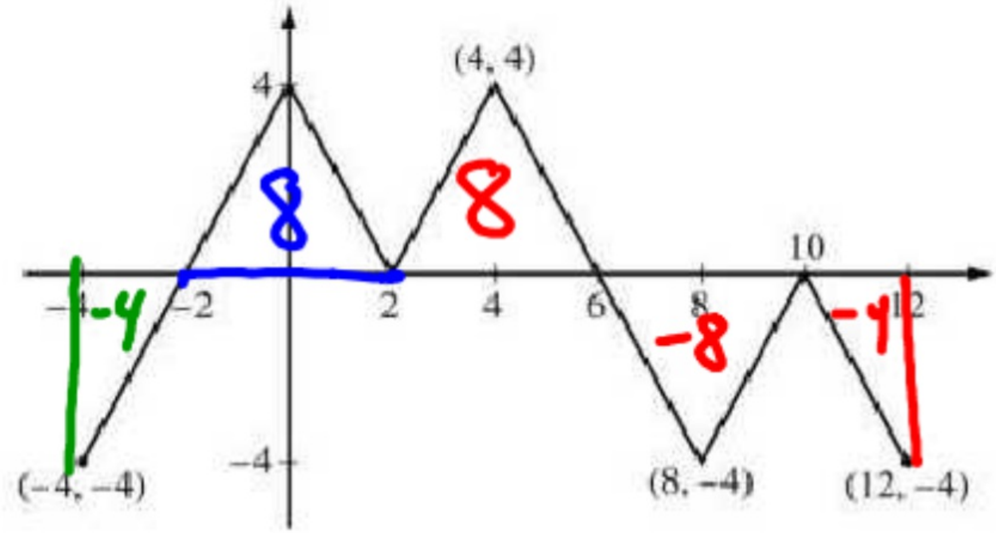
$f''(x) = 12x^2$

$f''(4) = 12(16) = \underline{192}$



HW

Continuous function $f(t)$ is graphed below on $[-4,12]$ and consists of 6 line segments.
Let $G(x) = \int_2^x f(t)\,dt$



Graph of f

Find the following values:

$G(10)$ $\int_2^{10} f(t)dt = 0$

$G(-2)$ $\int_2^{-2} f(t)dt = -\boxed{\int_{-2}^{2}}$

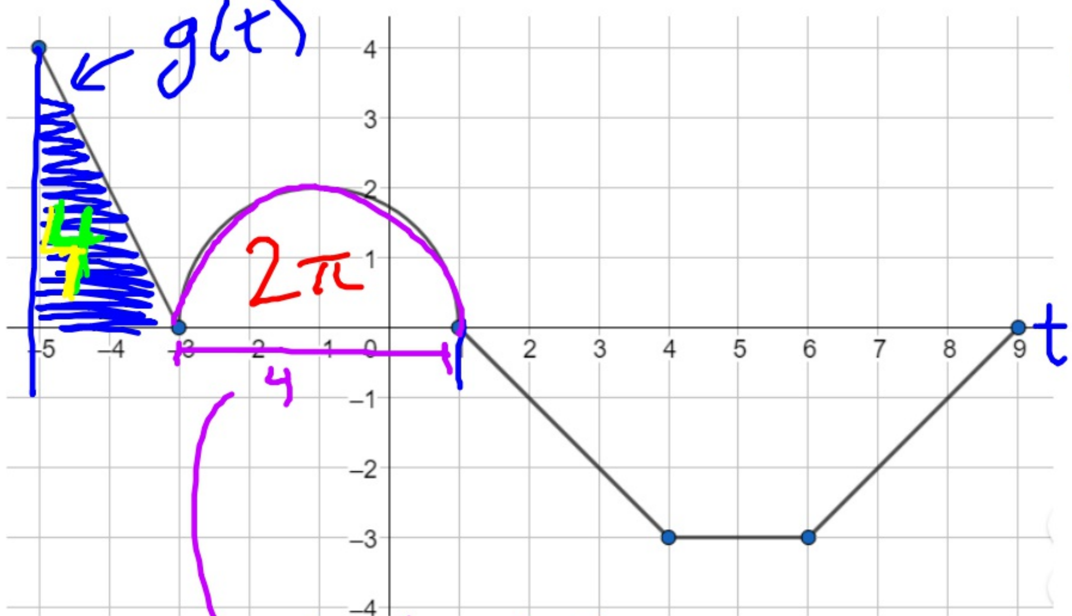
$G(10)$

-8

$G(-4)$
$= \int_2^{-4} \to -\int_{-4}^{2} = -4$

$G'(0)$

Another example of FTC, graphically



Let $H(x) = \int_{-5}^{x} g(t)\,dt$

Find H(1), H'(1), and H"(3).

$H(1) = \int_{-5}^{1} g(t)\,dt$

$\boxed{= 4 + 2\pi}$

$r = 2 \quad A = \frac{1}{2}\pi(2)^2$

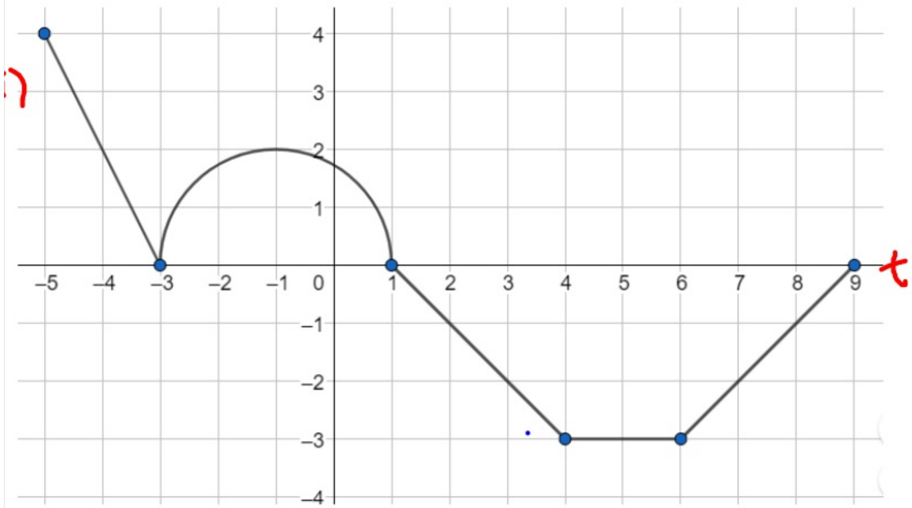
$H = \int g$

$H' = g$

$H'' = g'$

$H'(1) \rightarrow g(1) = 0$

$H''(3) \rightarrow g'(3) \rightarrow -1$ ← slope of g @ x = 3



g = H' → when is H' changing signs?

Find the x-coordinates of any relative maxima/minima for H. Justify

@ x=1 (rel max, b/c H' goes + → -)

Find the x-coordinates of any of H's inflection points. Justify

Sign change in $\boxed{H''}$ → g' → slope of g

@ x=-3
x=-1

~~x=4~~
~~x=6~~

these would NOT be IP because H'' or f' change to/from ZERO not pos/neg

(LOOK for uphill ⇄ downhill)

(sorry, announcements coming on early threw me off track)

Practice Assessment:
skills on it

I-A4a: area under a curve
I-U4: FTC: derivative as an inverse
I-U7: definite integral properties
I-U9: FTC, graphically

I-U5: Eval def integrals