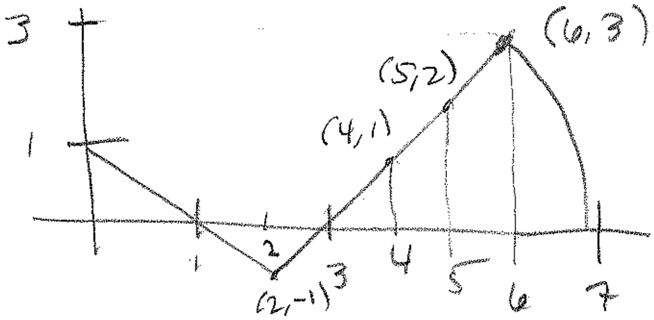
201 §4.3 #s 2, 3, 7, 25, 29, 39, 47, 49, 51

(2) $g(x) = \int_0^x f(t)\,dt$, where f is graphed



(a) $g(0) = 0$

$g(1) = \frac{1}{2}$

$g(2) = 0$

$g(3) = -\frac{1}{2}$

$g(4) = -\frac{1}{2} + \frac{1}{2} = 0$

$g(5) = 0 + \frac{1}{2}(1+2)(1) = \frac{3}{2}$

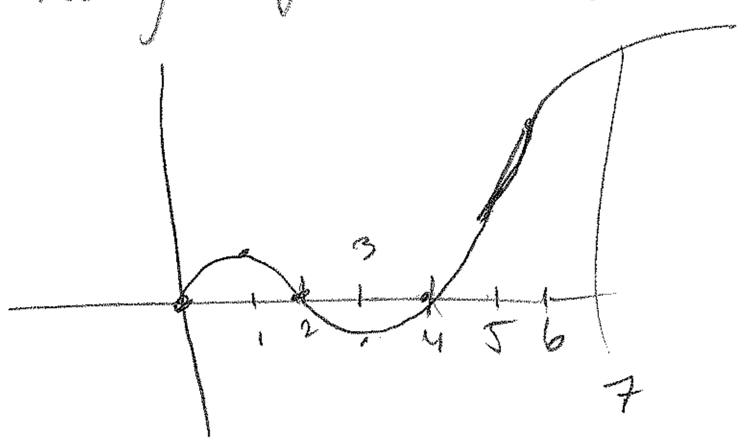
$g(6) = \frac{3}{2} + \frac{1}{2}(2+3)(1) = \frac{3}{2} + \frac{5}{2} = 4$

(b) $g(7) \approx g(6) + 2.1 \approx \boxed{6.1}$ ish

(c) g has a max @ $x = 1$ of $\frac{1}{2}$

g has a min @ $x = 3$ of $-\frac{1}{2}$

(d) Rough graph of g



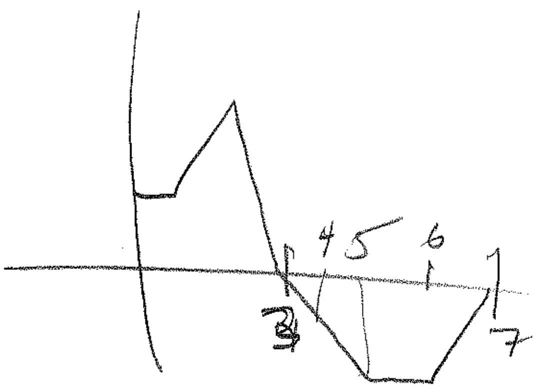
201 § 4.3 #s 3, 7, 25, 29, 39, 47, 49, 51

(3) Really? I assigned two of those?

Hmmmmm why?

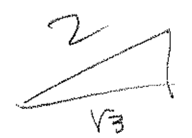
Oh. Intervals of increase & decrease.

$$g(x) = \int_0^x f(t)\,dt$$



(3b) g is increasing on $(0,3)$

(3c) g has max @ $x=3$



(7) $$\frac{d}{dx}\int_1^x \frac{1}{t^2+1}\,dt = \boxed{\frac{1}{x^2+1}}$$

(25) $$\int_{\frac{\pi}{6}}^{\pi} \sin\theta\,d\theta = -\cos\theta\Big]_{\frac{\pi}{6}}^{\pi} = -\cos\pi + \cos\frac{\pi}{6} = \boxed{+1+\frac{\sqrt{3}}{2}}$$

(29) $$\int_1^9 \frac{x-1}{\sqrt{x}}\,dx = \int\left(x^{\frac{1}{2}} - x^{-\frac{1}{2}}\right)dx$$

$$\left(\frac{x}{\sqrt{x}} = \sqrt{x},\quad \frac{1}{\sqrt{x}} = x^{-1/2}\right)$$

$$= \left[\frac{2}{3}x^{\frac{3}{2}} - 2x^{\frac{1}{2}}\right]_1^9 = \frac{2}{3}(9)^{\frac{3}{2}} - 2(9)^{\frac{1}{2}} - \left(\frac{2}{3}(1)^{\frac{3}{2}} - 2(1)^{\frac{1}{2}}\right)$$

$$= \frac{2}{3}(3^3) - 6 - \frac{2}{3} + 2$$

$$= 18 - 4 - \frac{2}{3} = \frac{42-2}{3} = \boxed{\frac{40}{3}}$$

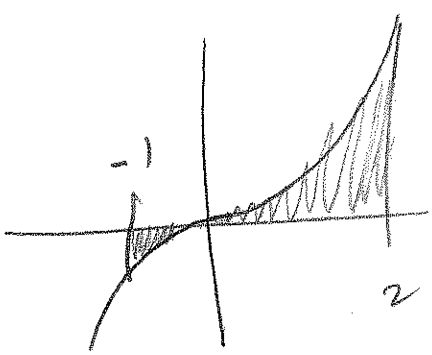
201 §4.3 #s 39, 47, 49, 51

(39) $\int_{-2}^{1} x^{-4}\,dx = \frac{x^{-3}}{-3}\Big]_{-3}^{1} = -\frac{3}{8}$

is WRONG b/c FTC II only applies to functions that are cnt^s on $[a,b]=[-2,1]$, which x^{-4} is not.

(47) Evaluate the integral & interpret as a difference of areas. Illustrate w/ sketch.

$$\int_{-1}^{2} x^3\,dx = \frac{1}{4}x^4\Big]_{-1}^{2} = \frac{1}{4}(2)^4 - \frac{1}{4}(-1)^4$$
$$= \frac{1}{4}(16) - \frac{1}{4} = 4 - \frac{1}{4} = \boxed{\frac{15}{4}}$$



$\int_{-1}^{2} x^3\,dx$ is signed area und $y=x^3$. The part between $x=-1$ & $x=0$ is NEGATIVE area.

(49) $$\frac{d}{dx}\int_{2x}^{3x} \frac{u^2-1}{u^2+1}\,du = \frac{d}{dx}\int_{2x}^{0}\frac{u^2-1}{u^2+1}\,du + \frac{d}{dx}\int_{0}^{3x}\frac{u^2-1}{u^2+1}\,du$$

$$= -\frac{d}{dx}\int_{0}^{2x}\frac{u^2-1}{u^2+1}\,du + \left(\frac{(3x)^2-1}{(3x)^2+1}\right)(3)$$

$$= -\left(\frac{(2x)^2-1}{(2x)^2+1}\right)(2) + \left(\frac{(3x)^2-1}{(3x)^2+1}\right)(9)$$

201 §4.3 #51

51 $h(x) = \int_{\sqrt{x}}^{x^3} \cos(t^2)\,dt$

$$\Rightarrow \frac{dh}{dx} = \frac{d}{dx}\left[\int_0^{x^3} \cos(t^2)\,dt - \int_0^{\sqrt{x}} \cos(t^2)\,dt\right]$$

$$= \cos((x^3)^2) \cdot 3x^2 - \cos((\sqrt{x})^2) \cdot \frac{1}{2}x^{-\frac{1}{2}}$$

$$= \boxed{3x^2\cos(x^6) - \frac{\cos(x)}{2\sqrt{x}}}$$