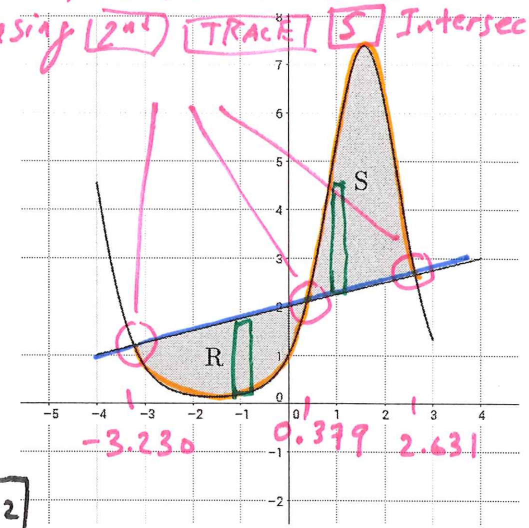
I-A4b Big Ol Practice Assessment

1. Let $f(x) = e^{2\sin x}$ and $g(x) = \frac{1}{4}x + 2$ be the boundaries of the regions R and S. Find the total area of R and S.

Find these in Calc. using $\boxed{2^{nd}}$ $\boxed{TRACE}$ $\boxed{5}$ Intersect



$$R = \int_{-3.230}^{0.379} \frac{1}{4}x + 2 - \left(e^{2\sin x}\right) dx \xrightarrow[\boxed{MATH}\ +\boxed{9}]{} 4.196$$

$$S = \int_{0.379}^{2.631} e^{2\sin x} - \left(\frac{1}{4}x + 2\right) dx \xrightarrow[\boxed{MATH}\ +\boxed{9}]{} 6.457$$

Total: $\boxed{10.653\,u^2}$

I-U7: Given $\int_0^5 f(x)\,dx = 10$ $\int_5^7 f(x)\,dx = 3$ $\int_{-2}^5 f(x)dx = -2$ Find each of the following:

2. $\int_7^{-2} f(x)\,dx$ $\rightarrow -\int_{-2}^{7} f(x)\,dx \rightarrow -\left[\int_{-2}^{5} f(x)\,dx + \int_5^7 f(x)\,dx\right]$

$-[-2+3] \rightarrow -1$

3. $\int_0^{-2} f(x)dx$

$= -\int_{-2}^{0} f(x)\,dx \Rightarrow -\left[\int_{-2}^{5} f(x)dx + \int_5^0 f(x)\,dx\right] \rightarrow -\left[\int_{-2}^{5} f(x)dx - \int_0^5 f(x)dx\right]$

$-[-2-10]$

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I-U4

Let $f(x) = \int_{-4}^{x^2} 4t^2 - 4t + 1\,dt$.

4. Find $f'(x)$. Simplify your answer.

$f'(x) = (4(x^2)^2 - 4x^2 + 1)(2x)$

$f'(x)\ (4x^4 - 4x^2 + 1)(2x) \rightarrow \underline{8x^5 - 8x^3 + 2x}$

5. Find all intervals where $f(x)$ is decreasing. Justify your answer.

$f'(x) < 0$

f': $-$ $-$ $+$ $+$

x: $-\sqrt{1/2}$ $\quad$ $-.5$ $\quad$ 0 $\quad$ $.5$ $\quad$ $\sqrt{1/2}$

$f'(x) = (4x^4 - 4x^2 + 1)(2x)$

$(2x^2 - 1)(2x^2 - 1)(2x) = 0$ Find C.N.

$2x^2 - 1 = 0$

$2x^2 = 1$

$x^2 = \frac{1}{2}$

$x = \pm\sqrt{1/2}$

$\approx \pm 0.707$

$x = 0$

$\leftarrow$ C.N.

f dec. on $(-\infty, -\sqrt{1/2})$ $(-\sqrt{1/2}, 0)$ b/c $f' < 0$

Plug in test values into f'

$f'(1000) = (+)(+)(+) = +$

$f'(-1000) = (+)(+)(-) = -$

$f'(0.5) = (-)(-)(+) = +$

$f'(-0.5) = (-)(-)(-) = -$

I-U9

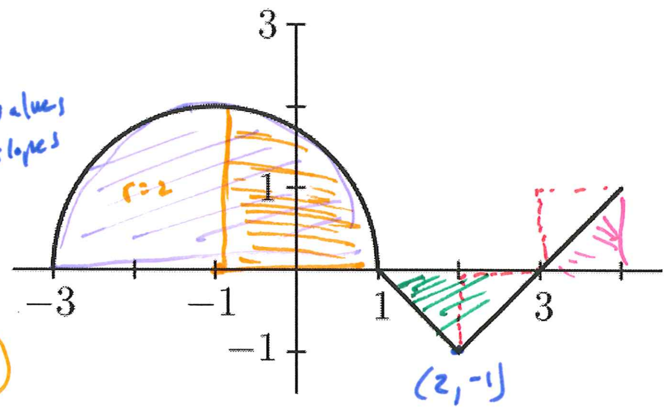
The function *a(t)* is shown over [-3,4] and consists of line segments and a semicircle.

Let $Q(x) = \int_1^x a(t)\,dt$ $\xrightarrow[\text{Part 1}]{\text{FTC}}$

$Q = \int a(t)$

$Q' = a(x)$ ← values

$Q'' = a'(x)$ ← slopes



6. Find $Q(-1)$, $Q'(2)$, and $Q''(3)$.

$Q(-1) = \int_1^{-1} a(t)\,dt$

$-\int_{-1}^{1} a(t)\,dt = -\frac{1}{4}(\pi)(2^2) = -\pi$

$Q'(2) = a(2) = \boxed{-1}$

$Q''(3) = a'(3) = \boxed{1}$

Slope of a @ x=3

7. Find the relative minima of $Q(x)$, if any, over [-3,4]. Justify your answer.

$Q'(x)$ changes sign $- \rightarrow +$

↳ AKA, $a(x)$. Only such sign change @ $\boxed{x=3}$

b/c $Q'(x)$ "$(a(x))$" changes sign $- \rightarrow +$ and $Q'(3) = 0$.

8. Find where $Q(x)$ has an absolute minimum value on $[-3,4]$. Show all calculations.

Possible only @ Relative ~~minimum~~ minima and endpoints.

Rel min @ $x=3$ $Q(3) = \int_1^3 a(t)\,dt = \frac{1}{2}\underbrace{(2)}_{\text{base}}\underbrace{(-1)}_{\text{height}} = -1$

Endpts

$x=-3$ $Q(-3) = \int_1^{-3} a(t)\,dt \Rightarrow -\int_{-3}^{1} a(t)\,dt = -\frac{1}{2}\cdot\pi(2^2)$

$= -2\pi$

Smallest

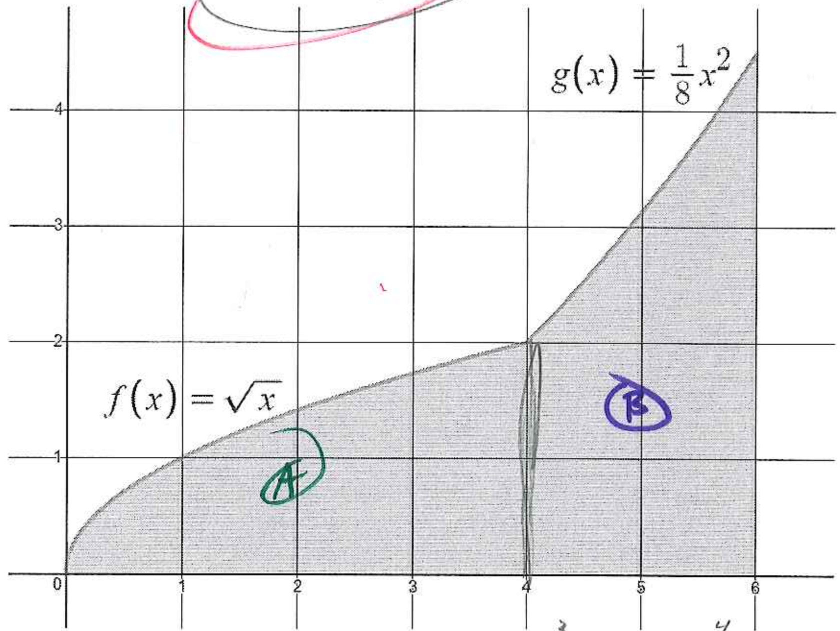
$x=4$ $Q(4) = \int_1^4 a(t)\,dt = -1 + \frac{1}{2} = -1/2$

Q(x) has abs min @ $x = -3$.

I-A4a NO CALC

$\frac{280}{24}$ or $35/3$ ← ANSWER

9. Find the area of the shaded region. Show all work.



A $\int_0^4 \sqrt{x}\,dx = \int_0^4 x^{\frac{1}{2}}\,dx$

$= \frac{2}{3}x^{3/2}\Big]_0^4$ rev power rule

$\frac{2}{3}(4)^{3/2} - \frac{2}{3}(0)^{3/2}$

$\frac{2}{3}(4^{1/2})^3 - 0$

$\frac{16}{3}$

B $\int_4^6 \frac{1}{8}x^2\,dx = \frac{1}{8}\cdot\frac{1}{3}x^3 \to \frac{1}{24}x^3\Big]_4^6$

$\frac{1}{24}(6)^3 - \frac{1}{24}(4)^3$

$\frac{216}{24} - \frac{64}{24} = \frac{152}{24}$

A B
$\frac{16}{3} + \frac{152}{24} \to \frac{128}{24} + \frac{152}{24}$

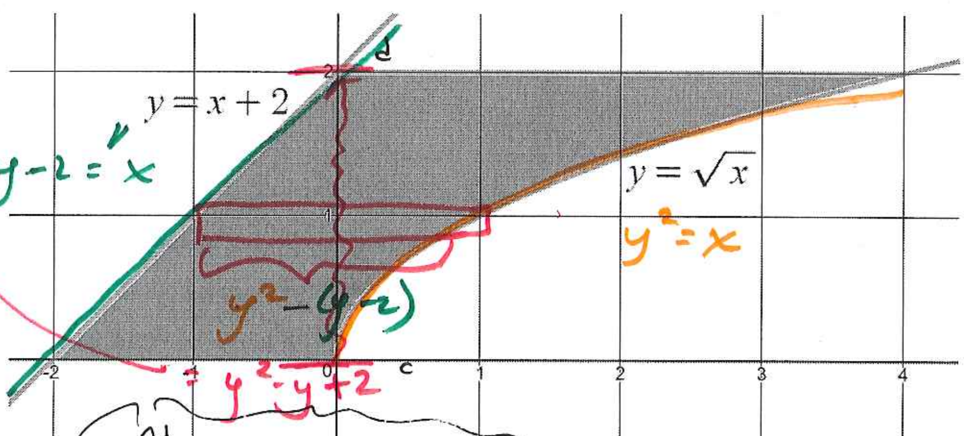
$\frac{280}{24}$

$6 \times 6 = 36$, $\times 6 = 216$, $-64 = 152$

$16 \times 8 = 128$

$128 + 152 = 280$

10. Find the area of the shaded region. Show all work.



$\int_c^d$ "Right minus left" dy

$\int_0^2 y^2 - y + 2\,dy$

$\frac{1}{3}y^3 - \frac{1}{2}y^2 + 2y\Big]_0^2$

$\frac{1}{3}\cdot 8 - \frac{1}{2}\cdot 4 + 4 - 0$

$\frac{8}{3} - 2 + 4$

$\frac{8}{3} + 2 \to \frac{8}{3} + \frac{6}{3} \to \frac{14}{3}$