AP Calculus <u>FYI: Next assess is Monday (B-day)</u>

I-U4: Applying FTC 1 (front of worksheet, #1-8)
I-U7: Definite integral properties (p. 274 hw)
I-A7a: Average Value (p 288 hw)
I-A4b: Area Between Curves (worksheet, tonight's hw)

Net Change AP Problem: 2000AB4 no calc

Water is pumped into an underground tank at a constant rate of 8 gallons per minute. Water leaks out of the tank at the rate of $\sqrt{t+1}$ gallons per minute, for $0 \le t \le 120$ minutes. At time $t = 0$, the tank contains 30 gallons of water.

(a) How many gallons of water leak out of the tank from time $t = 0$ to $t = 3$ minutes?

(b) How many gallons of water are in the tank at time $t = 3$ minutes?

(c) Write an expression for $A(t)$, the total number of gallons of water in the tank at time t.

(d) At what time t, for $0 \le t \le 120$, is the amount of water in the tank a maximum? Justify your answer.

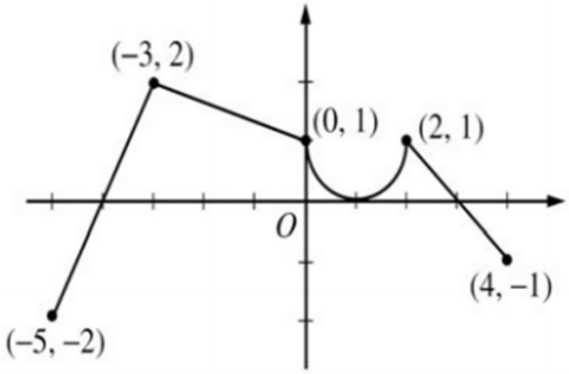
6 minutes of private think time

[redacted]

Table Talk:

Start with person who woke up the latest today
then go around the table to that person's left.
Once everyone has shared their ideas on the problem,
work as a group to answer all 4 parts.

FTC in action: 2004AB5 no calc



Graph of f

The graph of the function f shown above consists of a semicircle and three line segments. Let g be the function given by $g(x) = \int_{-3}^{x} f(t)\,dt$.

(a) Find $g(0)$ and $g'(0)$.

(b) Find all values of x in the open interval $(-5, 4)$ at which g attains a relative maximum. Justify your answer.

(c) Find the absolute minimum value of g on the closed interval $[-5, 4]$. Justify your answer.

(d) Find all values of x in the open interval $(-5, 4)$ at which the graph of g has a point of inflection.

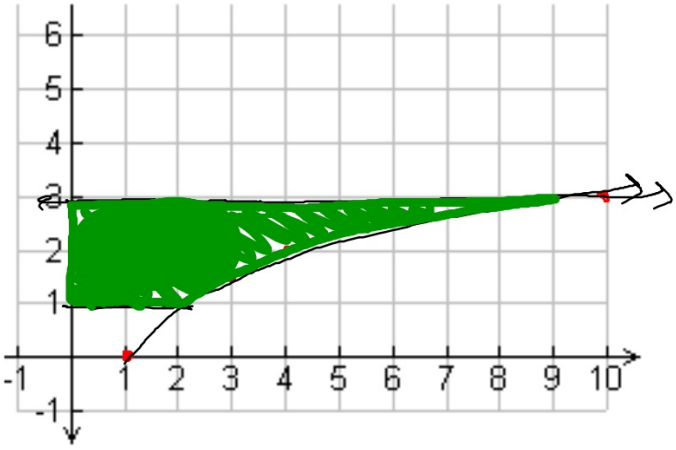
Share with your face-partner:

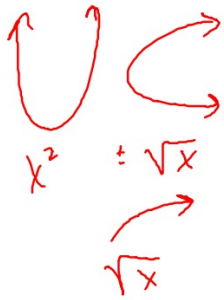
(+) something you have learned today

(+) something you are still not sure about

Area between curves, revisited: NOTES

Find the area of the region bounded by $y = \sqrt{x-1}$ and the *horizontal* lines y=1 and y=3.





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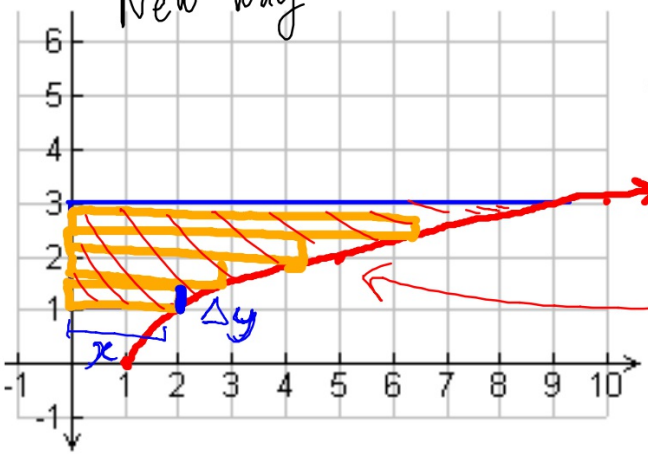
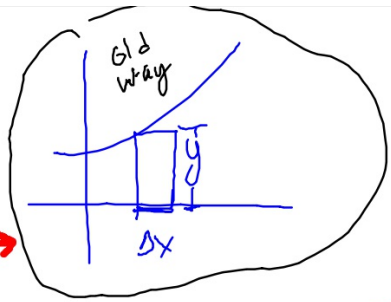
New way





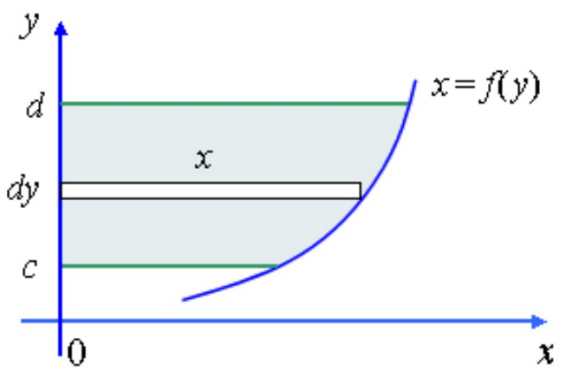
$$\boxed{\int_1^3 x \, \delta y}$$

$$\begin{cases} y = \sqrt{x-1} \\ y^2 = x-1 \\ y^2+1 = x \end{cases}$$

$$\int_1^3 \underbrace{y^2+1}\cdot dy$$

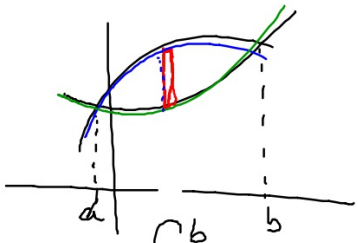
$$= \underline{10.667}$$

General forms:

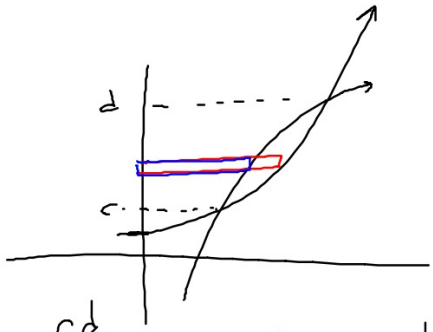


$$\text{Area} = \int_c^d f(y)\,dy$$

Area Between Curves

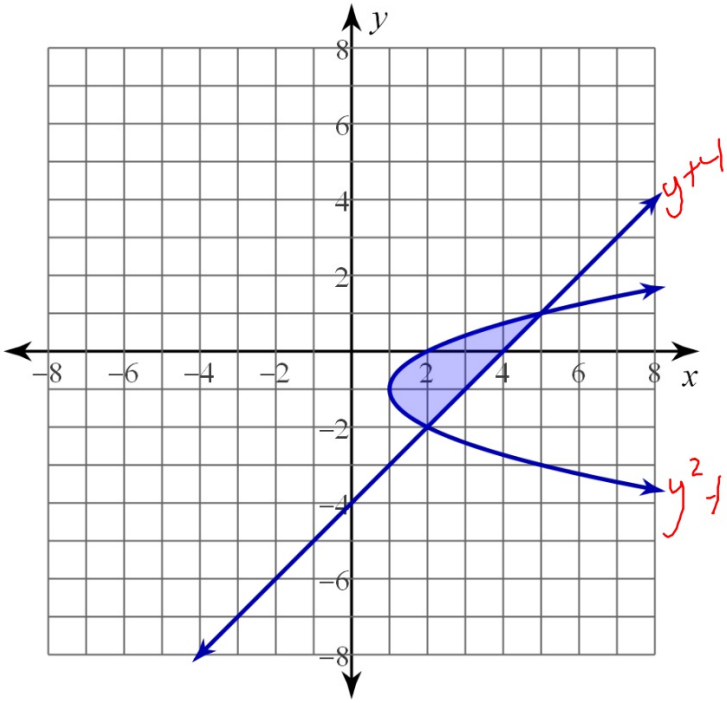


$$\int_a^b \text{top} - \text{bottom}\, dx$$



$$\int_c^d \text{right} - \text{left}\, dy$$

5. $x = y^2 + 2y + 2, \; x = y + 4$



$$\int_{\square}^{\square} \square - \square \, dy$$

$$\int_{-2}^{1} y+4-(y^2+2y+2)\,dy$$

$$\int_{-2}^{1} -y^2 - y + 2 \; dy$$