Good afternoon: warm up in notebooks (AP questions; no calculator)

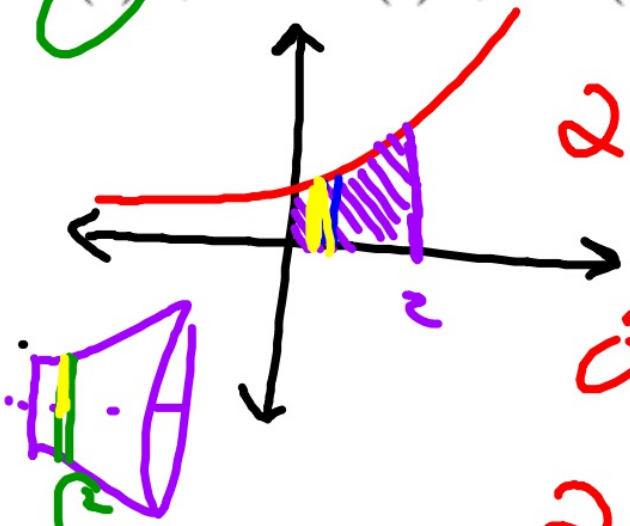
A particle moves along the x-axis. The velocity of the particle at time t is $6t - t^2$. What is the total distance traveled by the particle from time $t = 0$ to $t = 3$?

(A) 3 (B) 6 (C) 9 **(D) 18** (E) 27

$$\int_0^3 6t - t^2 \, dt = 3t^2 - 1/3t^3 \Big]_0^3 = 18$$

What is the area of the region in the first quadrant bounded by the graph of $y = e^{x/2}$ and the line $x = 2$?

(A) $2e - 2$ (B) $2e$ (C) $\frac{e}{2} - 1$ (D) $\frac{e-1}{2}$ (E) $e - 1$



$$\int_0^2 \pi \cdot y^2 \, dx \quad (f(x))^2$$

$$2\int_0^2 \frac{1}{2} e^{\frac{1}{2}x} \cdot dx$$

$$2\int_0^2 \frac{1}{2} e^{\frac{1}{2}x} \cdot dx$$

$$2\left[e^{\frac{1}{2}x} \right]_0^2 \rightarrow 2\left[e^{\frac{1}{2}\cdot 2} - e^{\frac{1}{2}\cdot 0} \right]$$

$$2\left[e - 1 \right]$$

$2e - 2$

HW

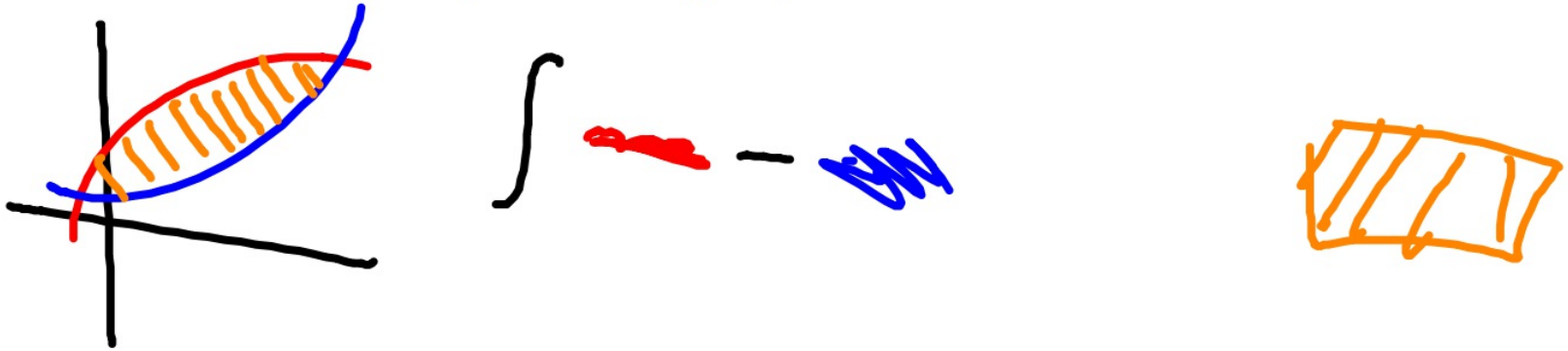
Area Between Curves Handout Answers

1. 13
2. 253/12
3. 27/2
4. 253/24
5. 40/3
6. 125/6
7. 125/12
8. 59/3
9. 16
10. 8

AP Free Response Problems on Area Between Curves

- Work with a partner
- Copy problem/graph neatly onto chart paper

- Find limits of integration (intersection pts) when needed!!!
- Use colors mindfully (same color for curve + function in integral)
- Show correct set up for integral, then calculator answer to 3 decimals



Net Change Theorem (notes)

$$\int_a^b f'(x)\,dx = f(b) - f(a) \qquad \text{FTC}$$

$$\downarrow$$

$$f(a) + \int_a^b f'(x)\,dx = f(b)$$

$$\simeq$$

$$\underbrace{f(b)}_{\text{future value}} = \underbrace{f(a)}_{\text{starting value}} + \underbrace{\int_a^b f'(x)\,dx}_{\text{accumulated change}}$$

Net change theorem

The amount of money at $t=3$ (2003) in a college fund is \$4000. It grows at a rate of $2e^{0.05t}$ \$/yr for $t \geq 3$. How much money is in the fund in 2017? ($t=17$).

$$f(17) = f(3) + \int_3^{17} 2e^{0.05t} \, dt$$

$$= 4000 + 47.11$$

$$= \$4047.11$$

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#41-55

#63-70.