MA 121 - 003

Wednesday, October 31

TEST #3: MONDAY, NOVEMBER 5

(2.5 ; 3.1 → 3.5 ; 4.1 → 4.3)

4.1:

find $f(x)$ such that $f'(x) = 3x+2$

and $f(1) = 5$. $\left(\begin{matrix} x=1 \\ y=5 \end{matrix}\right)$ (find C)

$f(x) = \int (3x+2)\,dx$ (indef. integral)

pt (1, 5)

$f(x) = 3\cdot\frac{x^2}{2} + 2x + C$

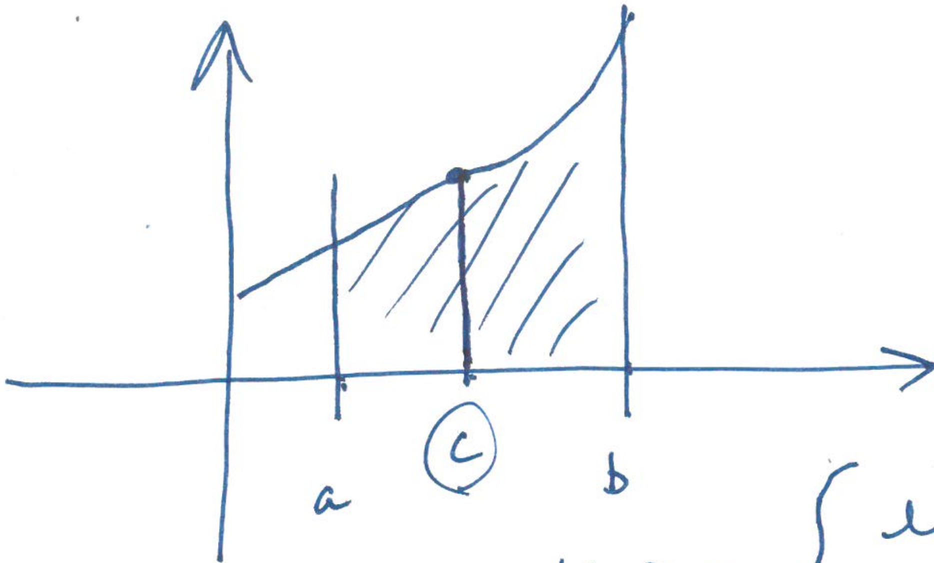
$5 = \frac{3}{2}(1)^2 + 2(1) + C$

$5 = \frac{3}{2} + 2 + C$

$-3\tfrac{1}{2} \qquad -3\tfrac{1}{2}$

$1\tfrac{1}{2} = C$

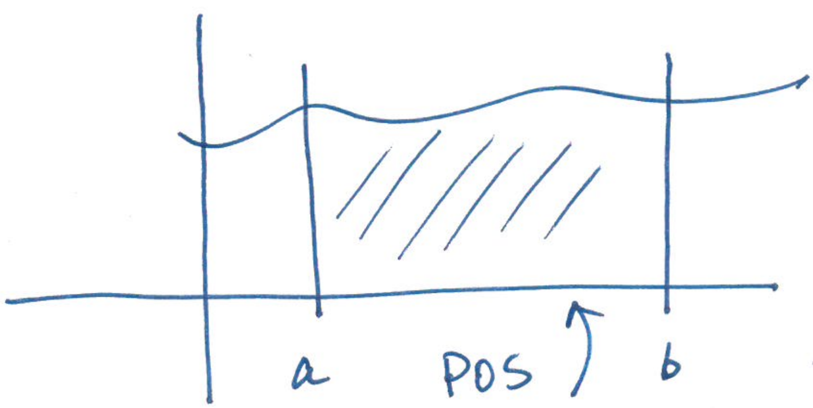
$f(x) = \frac{3}{2}x^2 + 2x + 1\tfrac{1}{2}$

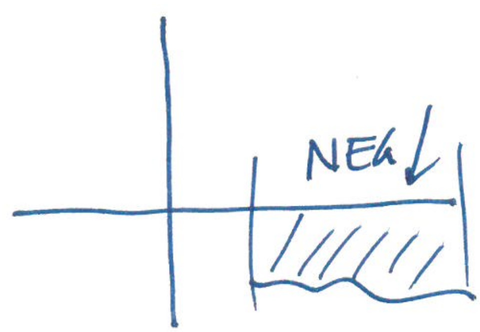


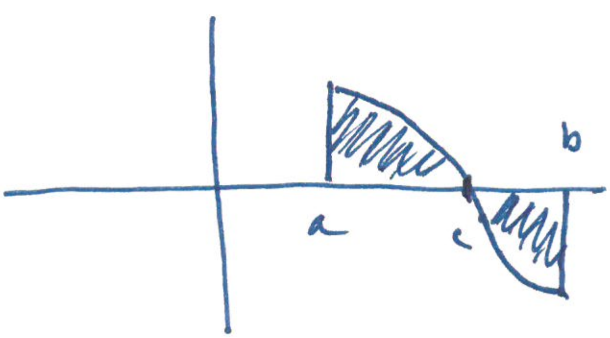
$$f(x) = \begin{cases} \text{line} \ldots \\ \text{curve} \ldots \end{cases}$$

continuous

$$\int_a^b f(x)\,dx = \int_a^c \text{line} + \int_c^b \text{curve}$$

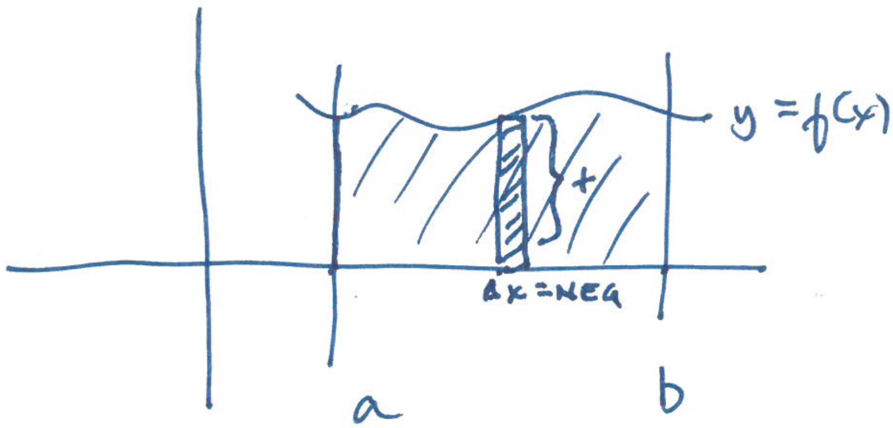






$$\int_a^b f(x)\,dx = 0$$

① $\int_a^c f(x)\,dx$



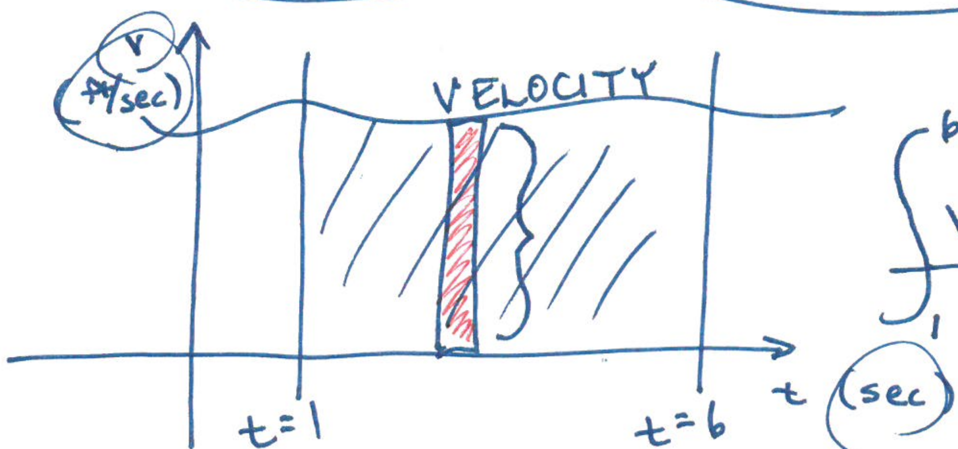
$$\int_a^a f(x)\,dx = 0$$

$$\int_a^b f(x)\,dx = +12$$

$$a \longrightarrow b$$

$$\int_b^a f(x)\,dx = -12$$

$$a \longleftarrow b$$



$$\int_1^b v(t)\cdot dt = \sim \text{ft}$$

$$A = (\sim \text{ft/sec})(\sim \text{sec}) = \sim \text{ft}$$

$$s(t) \xrightarrow{\text{DERIV}} v(t)$$

$$s(t) \xleftarrow{\text{ANTIDERIV.}} v(t)$$

TEST #3:

2.5: max/min word prob
(OPTIMIZATION)
—procedure . . . .

→ 3.1: $d(e^{u}) = e^{u} \cdot du$
$d(e^{f(x)}) = e^{f(x)} \cdot f'(x)$

→ 3.2: $d(\ln u) = \frac{1}{u} \cdot du$
$d(\ln f(x)) = \frac{1}{f(x)} \cdot f'(x)$

3.3: exp. growth
LOGISTIC: $y = \frac{L}{1+b\cdot e^{kt}}$ $y = y_0 \cdot e^{kt}$ know *

3.4: exp. growth
NEWTON'S LAW OF COOLING:
$y = a \cdot e^{kt} + m$

3.5: $d(a^{u}) = a^{u} \cdot \ln a \cdot du$
$d(a^{f(x)}) = a^{f(x)} \cdot \ln a \cdot f'(x)$

$d(\log_a u) = \frac{1}{u \cdot \ln a} \cdot du$
$d(\log_a f(x)) = \frac{1}{f(x) \cdot \ln a} \cdot f'(x)$

4.1: indef integrals

$$\int a \cdot x^n \, dx = a \cdot \frac{x^{n+1}}{n+1} + C$$

(for $n \neq -1$)

$$\int a \cdot x^{-1} \, dx = \int a \cdot \frac{1}{x} \, dx = a \cdot \ln|x| + C$$

$$\int a \cdot e^{bx} \, dx = a \cdot \frac{1}{b} e^{bx} + C$$

4.2: no approx areas

$$A = \int_a^b f(x) \cdot dx = F(x) \Big]_a^b$$

$$= F(b) - F(a)$$