Anti - Derivatives

Indefinite Integral

constant

$$\int f(x)\,dx = F(x) + C$$

$$\boxed{\int_a^b f(x)\,dx = \text{Area}}$$

$$F'(x) = f(x)$$

Ex $\int \cos(x)\,dx = \sin(x) + C$

Ex $\int \sin(x)\,dx = -\cos(x) + C$

Ex $\int e^x\,dx = e^x + C$

Ex $\int \cosh(x)\,dx = \sinh(x) + C$

Ex $\int \sinh(x)\,dx = \cosh(x) + C$

Ex $\int \sec^2(x)\,dx = \tan(x) + C$

Ex $\int \frac{1}{x}\,dx = \ln|x| + C$

Domain $x \neq 0$

Ex $\int \text{constant}\,dx = \text{constant} \cdot x + C$

Power Rule $\int x^n\,dx \quad \frac{x^{n+1}}{n+1} + C$

Ex $\int x^4\,dx = \frac{x^5}{5} + C$

Ex $\int 3x^2\,dx = x^3$

$$\frac{d}{dx} c \cdot f(x) = c \cdot \frac{d f(x)}{dx}$$

$$\int c\, f(x)\,dx = c \cdot \int f(x)\,dx$$

$$\frac{d}{dx} f + g = \frac{df}{dx} + \frac{dg}{dx}$$

$$\int f + g \; dx = \int f\,dx + \int g\,dx$$

Quartic Regression:

$$Y_1 = Ax^4 + Bx^3 + Cx^2 + Dx + E$$

$$Y_2 = Ax^5/5 + Bx^4/4 + Cx^3/3 + Dx^2/2 + Ex$$

$\int f(x)\,dx$ $\int_a^b f(x)\,dx$

FUNDAMENTAL THEO OF CALCULUS

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Calc 7: $\int f(x)\,dx$

Lower : 0

Upper : 30

$\int f(x)\,dx$: 11.7 Trillion

$$Y_2(30) - Y_2(0)$$

11.7 Trill

'Words' "Lady G Made
11.7 Trillion between
birth & 30yrs."

389.88 million "Average"
worth.

$$\int \frac{f'(x)}{f(x)}\,dx = \ln|f(x)| + C$$

$$\frac{1}{f(x)} \cdot f'(x)$$

$$\frac{d}{dx}\frac{e^{12x}}{12} = \frac{e^{12x}\cdot \cancel{12}}{\cancel{12}}$$

$$\frac{e^{12x}}{12} + C = \int e^{12x}\,dx$$

Derivative

Regular

$$y = 2x + 3$$

$$y' = 2$$

$$\frac{dy}{dx} = 2$$

$$\frac{d}{dx} y = 2$$

Implicit

$$\frac{d}{dx} y^2 = \frac{d}{dx} x^2$$

$$2y\, y' = 2x$$

$$y' = x/y$$

Related Rates

$$\frac{d}{dt} y^2 = \frac{d}{dt} x^2$$

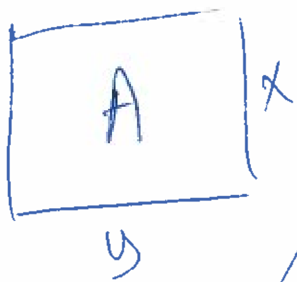
$$2y \cdot \frac{dy}{dt} = 2x \frac{dx}{dt}$$

x, y values , $\frac{dx}{dt}$, $\frac{dy}{dt}$ Rates

$$y = f(x) \rightarrow dy = f'(x)\,dx$$

$$\Delta y \approx \underline{dy = f'(x)\,dx}$$

$$A = x \cdot y$$



what is the error in the area if $x = 2$
$y = 3$

error in x is $\pm .05 = dx$
" is $\pm .1 = dy$

$$dA = x \cdot dy + y \cdot dx$$

$$2 \cdot (.1) + 3 \cdot .05$$

$$.2 + .15$$

$$.35$$

Area $6 \pm .35$ error

Differentials

$$y^2 = x^2 + 2$$

$$d(y^2) = d(x^2)$$

$$2y\,dy = 2x\,dx$$

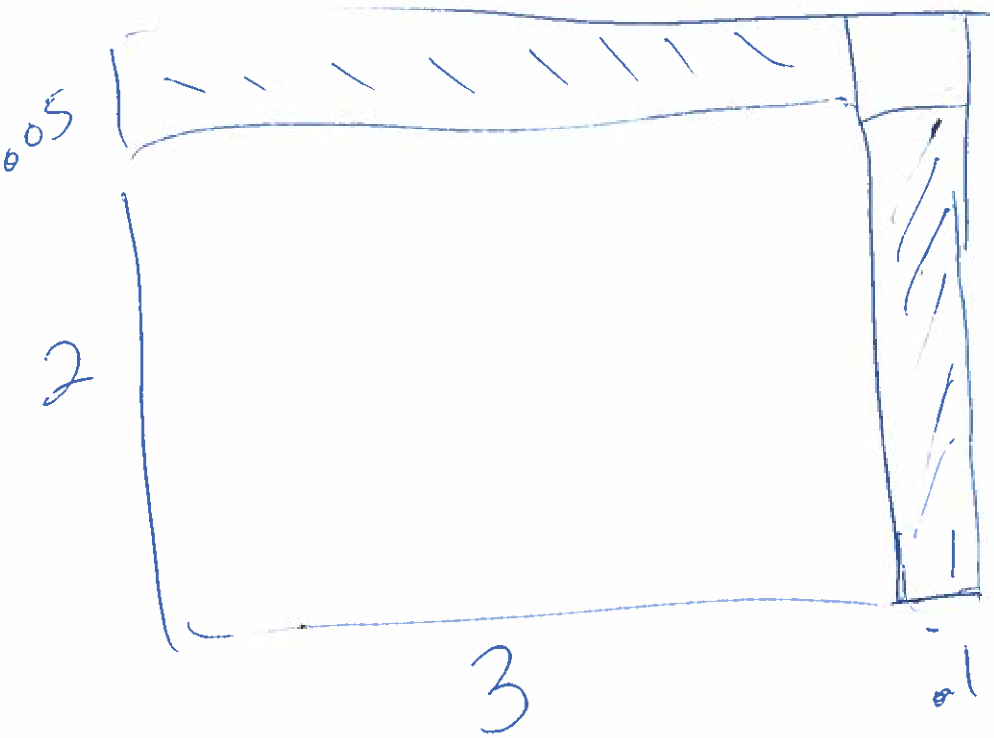
$$\int_a^b f(x)\,dx$$

$$\Delta X = X_2 - X_1$$

$$\Delta Y = Y_2 - Y_1$$

ERROR

% error $\frac{.35}{6} \times 100 = 5.83\%$

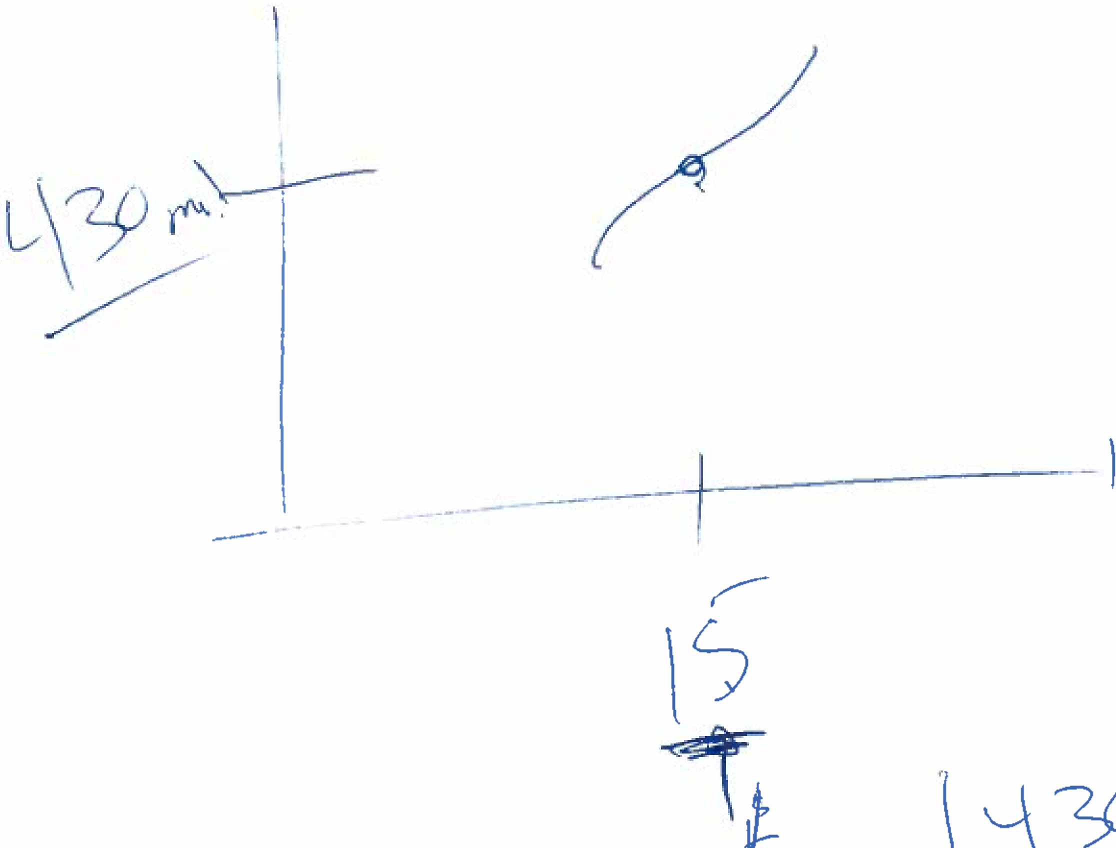


$.1 \times .05$

$= .005$

insigh

$\Delta A \mid 3.1 \times 2.05)$



430 ml

± 11.27

%error 2.62%

Error

$$y = f(x)$$

$$dy = d\,f(x)$$

$$= \underline{f'(y)}\,dx$$

$$f'(15) \cdot \pm .5$$

$$22.55 \cdot (.5)$$

Error 11.27

GROUP NAME: W. T. [illegible]

Date: 4/17/14

Student Names (First and Last)

Speaker/Presenter: Michael, Jenna

Writer/Prep: Charles, Kathleen

Leader/Collaborator: Cathleen

Independant Variable (x-axis): year

Dependant Variable (y-axis): steroid [illegible]

Conclusion (in words):

Every year [illegible] the average steroid exposure is 148.45 [illegible] per year

Supporting Work:

D

X Y

Quartic Reg: $Ax^4 + Bx^3 + Cx^2 + Dx + E$

$f = 0.0356 x^4 + 0.451 x^3 + 3.9307 x^2 + -19.5679 x + 172.1976$

Antiderivative: $Ax^5/5 + Bx^4/4 + Cx^3/3 + Dx^2/2 + Ex$

$Y_2 = 0.0356 x^5/5 + 0.451 x^4/4 + 3.9307 x^3/3 + -19.5679 x^2/2 + 172.1976x$

$Y_2(12) - Y_2(0) = 1781.5175$

Ave $= Ans/12 = 148.4598$

$\int_0^{12} f(x)dx = 1781.5175 / 12 = 148.5$

Fundamental Theorem of Calculus

$\int f(x)\,dx = F(b) - F(a)$

GROUP NAME: P. minions

Date: 4/17/14

Independant Variable (x-axis): years

Dependant Variable (y-axis): $tuition

Student Names (First and Last)

Speaker/Presenter: Kero / Dallen

Writer/Prep: Jenn

Leader/Collaborator: Jason / Daniella

Conclusion (in words):

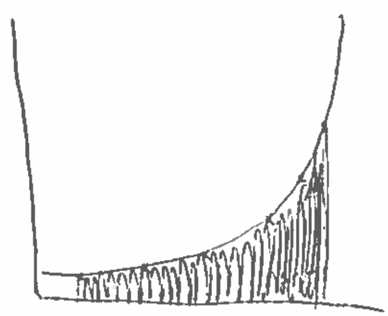
International students pay on average $3354 a year over 4 years.

Supporting Work:

quartic

$y_1 = -2.041\ldots x^4 + 97.916\ldots x^3 + -1733.958x^2 + 13477.083x + -35573.999\ldots$

$y_2 = -2.041\ldots x^5/5 + 97.916\ldots x^4/4 + -1733.958x^3/3 + 13477.083\ldots x^2/2 + -35573.999\ldots x$



$\int f(x)\,dx = \underline{13418.089}$

$y_2(14) - y_2(10)$

$= \underline{13418.089}$

on average:

$\frac{13418.089}{4} = 3354.52\ldots$

GROUP NAME: Fluffy Ponies

Date: 4/17/14

Independant Variable (x-axis): income

Dependant Variable (y-axis): crime rate

Student Names (First and Last)

Speaker/Presenter: Milton

Writer/Prep: Courtney

Leader/Collaborator: Tyler / Jury

Conclusion (in words):
For people making between 20k and 100k per year, the average chance of committing a crime is ~~18.6844%~~ per 1k
.2335% per year

Supporting Work:

$$y_1 = -1.04167.. \times 10^{-8} x^4 + 2.9167... \times 10^{-6} x^3 - 9.5833.. \times 10^{-5} x^2 - .01267... x + .74$$

$$y_2 = -1.04167.. \times 10^{-8} x^5/5 + 2.9167.. \times 10^{-6} x^4/4 - 9.5833.. \times 10^{-5} x^3/3 - .01267.. x^2/2 + .74x$$

$$7: \int_{20}^{100} f(x)\,dx = 18.6844/80 = .2335$$

$$y_2(100) - y_2(20) = 18.6844/80 = .2335$$