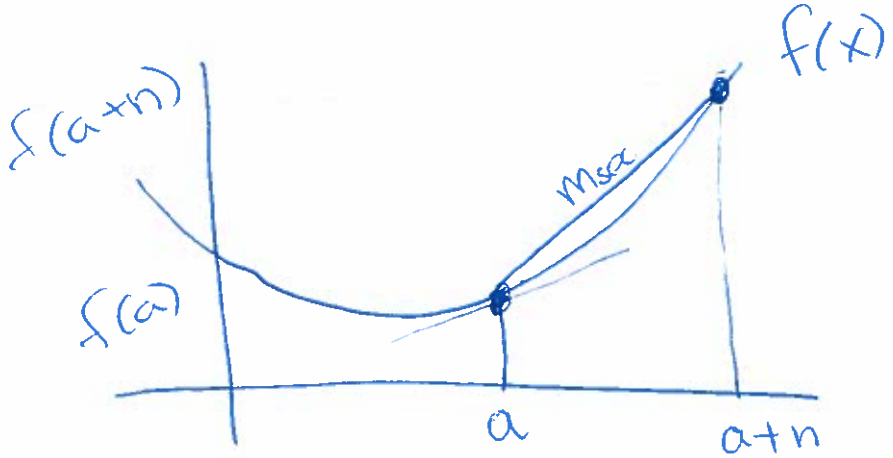
Instantaneous Rate of Change



Slope of secant line $m_{sec} = \frac{\Delta y}{\Delta x}$

$$m_{sec} = \frac{f(a+h) - f(a)}{h}$$ = Ave rate between a & a+h.

$$m_{tan} = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

~~Definition of Derivative~~

Slope of tangent Line

Instantaneous rate of change

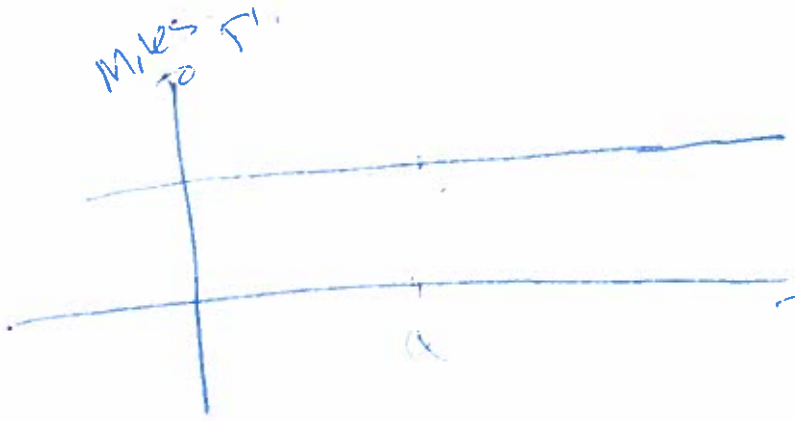
$f'(a)$ or $\left.\frac{dy}{dx}\right|_{x=a}$ $D_x(a)$

Derivative at a Point

$f'(a)$

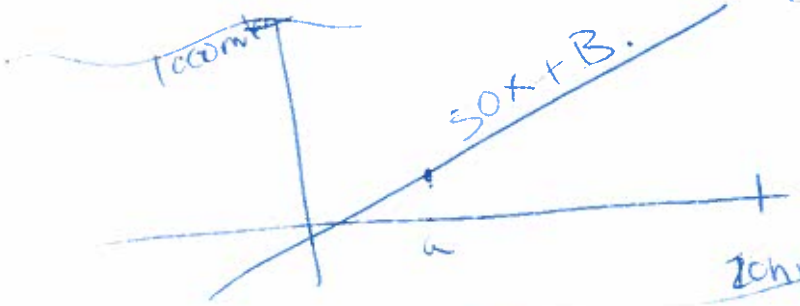
Derivate as a Function

$f'(x)$



$f(x) = \text{constant}$

$f'(x) = 0$



$f(x) = Ax + B$

$f'(x) = A$

$f(x) = Ax^2 + Bx + C$

$f'(x) = 2Ax + B$

$f(x) = Ax^3 + Bx^2 + Cx + D$

$f'(x) = 3Ax^2 + 2Bx + C$

$f(x) = Ax^4 + Bx^3 + Cx^2 + Dx + E$

$f'(x) = 4Ax^3 + 3Bx^2 + 2C + D$

$$f(x) = Ax^2 + Bx + C$$

$$f(a+h) = A(a+h)^2 + B(a+h) + C$$

$$= Aa^2 + A\,2ah + Ah^2 + Ba + Bh + C$$

$$f(a) = Aa^2 + Ba + C$$

$$\frac{f(a+h) - f(a)}{h} = \frac{2Aah + Ah^2 + Bh}{h}$$

$$\frac{f(a+h) - f(a)}{h} = 2Aa + Ah + B$$

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h} = \lim_{h \to 0} 2Aa + \cancel{Ah}^{\,0} + B$$

$$f'(a) = 2Aa + B$$

$$f'(x) = 2Ax + B$$

$Y_1 = ($ lin reg $)$

$Y_2 = ($ Quad reg $)$

$Y_3 = ($ cubic reg $)$

$Y_4 = ($ Quart reg $)$

$Y_5 = nderiv($ Función, X, X $)$

Evaluate at X

math 8: nderiv

GROUP NAME: ♡ Science

Date: 6 FEB 19

Student Names (First and Last)

Speaker/Presenter: Corrina Hansen

Writer/Prep: Lindsy Lansberry

Leader/Collaborator:

Independant Variable (x-axis): Time (hrs)

Dependant Variable (y-axis): Drug Concentration (PPM)

Conclusion (in words): According to a quadratic function (y_2) at 8 hours the drug concentration is increasing by 25.857 PPM/hr.

Supporting Work:

Time hrs	Drug Concentration (PPM)
0	100
1	80
2	50
3	40
4	35

$y_1 = -17$

$y_2 = 2 * 3.57 \ldots x' + 51.28 \ldots$

$y_3 = 3 * 1.25 \ldots x^2 + 2 * -3.92 \ldots x' - 20.53 \ldots$

$y_4 = 4 * -1.87 \ldots x^3 + 3 * 16.24 \ldots x^2 + 2 * -40.62 \ldots x' + 6.24 \ldots$

X	Y_1	Y_2	Y_3	Y_4	Y_5
1	-17	-24.141	-24.64	-33.15	-33.75
2	-17	-17	-21.25	-21.25	-21.25
3	-17	-9.857	-10.56	-1.25	-1.25

GROUP NAME: Shoes

Date: 2/6/14

Student Names (First and Last)

Speaker/Presenter: Dominique Carney

Writer/Prep: Valeen Sinclair

Leader/Collaborator: [illegible]

Independant Variable (x-axis): $1,000

Dependant Variable (y-axis): Shoes

Conclusion (in words):

At $70K we pick up 1.3 pairs of shoes for every $1K we make.

Supporting Work:

(2AX+B)

(Linear)

Y1=.22951467247 11

(quadratic)

Y2=2*1.233902003212 3E-

4X^2+1076567291 3912

(cubic)

Y3=3*-6.85140189458 97E-

7X^2+2*.00119070041486X^

1+-.3464015944067 7

(Quartic)

Y4=4*-1.365551131891 1E-8X^3+3*2

.4590296844789E-5X^2*2-.013

8.06420267 53X^1+2.88232267381 87

Y5=(Derivitive)

X	Y
100	145
205	170
505	185
607	280
909	330

GROUP NAME: Rusty Group

Date: Feb. 6, 2014

Student Names (First and Last) Greg McAvoy

Speaker/Presenter: Brandon Ray

Writer/Prep: Keith Meserall

Leader/Collaborator: Harrison

Independant Variable (x-axis): years

Dependant Variable (y-axis): % of Rust

Conclusion (in words):

The Rust increases by 2.4% per year. In 2014 according to quartic regression.

Supporting Work:

L_1	L_2
1470	3
1480	14
1490	19
2000	24
2010	29
2014	38

Y_1 .641...

Y_2 $2 \times -3.3e^{-4} X^1 + 2 \times 2.04...$

Y_3 $3 < 9.46... e^{-4} X^2 + 2 < -5.66... X +$ 11285.13...

Y_4

GROUP NAME: Squiggles R us

Date: 2/6/2014

Student Names (First and Last)

Speaker/Presenter: Kevin I

Writer/Prep: [illegible]

Leader/Collaborator: [illegible]

Trainee: Anik Patel

Independant Variable (x-axis): month

Dependant Variable (y-axis): # of iphone 4s sold

Conclusion (in words): At 5 months the sales will drop 95 per month

Supporting Work:

X	Y
5	100
10	75
15	50
20	90
25	60

* Linear *

$Y_1 = -1.3$

* Quadratic *

$Y_2 = 2 \times .1571\ldots x + -6.0142$

* cubic *

$Y_3 = 3 \times -.046\ldots x^2 + 2.2571\ldots x + -33.5476$

* quartic *

$Y_4 = 4 \times -.0133\ldots x^3 + .7533\ldots x^2 + -14.2066\ldots x + 102.1666$

$Y_5 =$ [illegible]

GROUP NAME: E1 Business

Date: 1/6/14

Student Names (First and Last)

Speaker/Presenter: Ryan Z.

Writer/Prep: Brittany Bayo

Leader/Collaborator: Andy Z.

Independant Variable (x-axis): World Cups

Dependant Variable (y-axis): Goals Scored

Conclusion (in words): The instantaneous (derivative) rate of change in the 5th upcoming world cup is increasing by 2.2 goals, 5.65 or 2.19 goals according to our linear, quadratic & cubic regression respectively; per world cup.

Supporting Work:

Y= STAT CALC Y_1 = lin

VARS 5: > > enter Y_2 = quad

Y_3 = Cublic

Y_4 = Quard

Y= Y_5 MATH 8:

VARS 5: > > enter Y_5 = nderiv

) X) X) enter

TBLSET set to ask

Table (second graph)

input values and confirm

Y_1 gives same values

Y_4 & Y_5 give same values

Y= 2nd Delete (insert)

Y_1 → delete everything after & including X

Y_2 → 2nd del 2 * down to x change power to 1 go to next x & delete x & all after

Y_3 → 2nd del 3 * down to x change power to 2 go to next term

2nd del 2 * down to x change power to 1 go to next x & delete it and all that follows

Y_4 → 2nd del 4 * down to x change power to 3 go to next term

2nd del 3 * down to x change power to 2 go to next term

2nd del 2 * down to x change power to 1 go to next x & delete it and all that follows