Composite Functions $(f \circ g)(x)$

$f(g(x))$

= Assembly line

Input: x

1st Output: $g(x)$

Input $g(x)$

Output $f(g(x))$

$(f \circ g \circ h)(x)$

$f(g(h(x)))$

Transformations

x	y(x)
1995	5,238,624
1996	6,225,629
1997	9,724,629

→

$h(x) \equiv x - 1900$

x	h(x)
1995	95
1996	96
1997	97

95	5
96	
97	

$g(x) \equiv$ sales $\frac{x}{1,000,000}$

1995	
19	

$Y_2 = Out(Reg.(In(x)))$

x (cm)	y.
185cm	90. kg.

Derivatives of Composite Functions

Chain Rule.

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

Ex $y = \sin(e^x)$ $\quad y' = \cos(e^x) \cdot \frac{d}{dx} e^x$

outside: $\sin(\quad)$ inside: e^x

$= \cos(e^x) \cdot e^x$

Ex $y = e^{2x}$ $\quad y' = e^{(2x)} \cdot \frac{d}{dx} 2x$

outside: $e^{(\quad)}$ inside: $2x$

$= e^{2x} \cdot 2$

or $2e^{2x}$

Ex $y = (x^2 - 5x + 7)^{100}$ $\quad y' = 100(x^2 - 5x + 7)^{99} \frac{d}{dx}(x^2 - 5x)$

$100(x^2 - 5x + 7)^{99} \cdot (2x - 5)$

Ex $\cos^2(4(x)) = \left(\cos\left(4(x)\right)\right)^2$ ← out most

$\frac{d}{dx}\cos^2(4x) = 2\left(\cos(4x)\right)^1 \cdot \frac{d}{dx}\cos(4x)$

$2\cos(4x)\cdot(-\sin(4x))\cdot\frac{d}{dx}(4x)$

$2\cos(4x)\cdot(-\sin(4x))\cdot 4$ ✓

or

$-8\cos(4x)\sin(4x)$

[connect $\cos 4x = \cos(4x)$]

Ex $\frac{d}{dx}\sec(3x) = \sec(3x)\tan(3x)\cdot\frac{d}{dx}(3x)$

↑ outer

$= 3\sec(3x)\tan(3x)$

I WANT ~~YOU~~

EYROS

Sales 1985:

0 → 1988

1 → 1988.5 → 1

2 → 1989

Input $x \rightarrow y$ Output

95	1995	5238604
96	1996	6225629
97	1997	8724622

5.2 million
6.2
8.7

$g(x) = x + 1990$

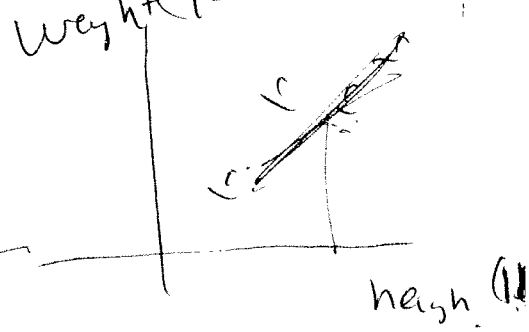
$y(x)$

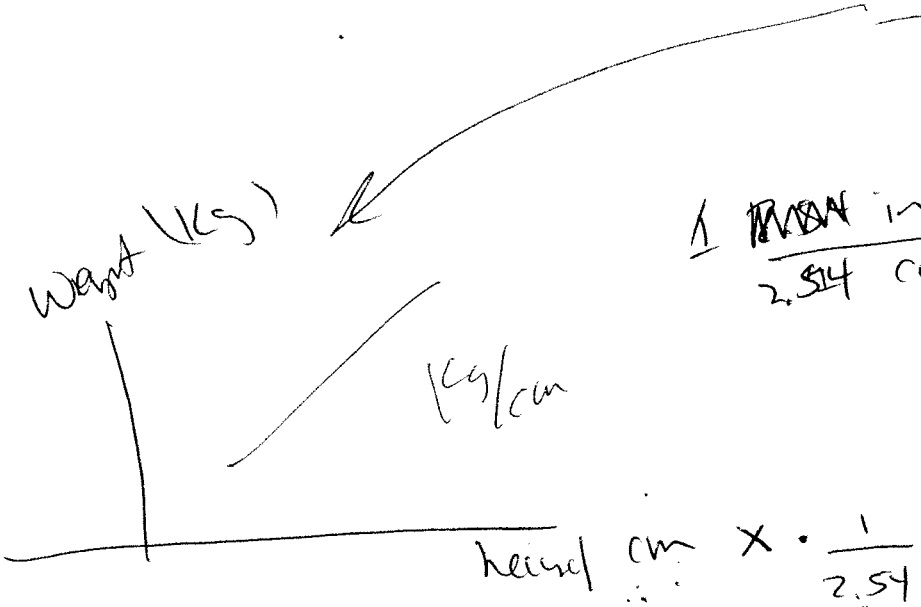
$h(x) = \frac{x}{1{,}000{,}000}$

$h(y(g(x)))$

$(h \circ y \circ g)(x)$

$y_1 = (h \circ y \circ g)(95)$





$x \cdot \frac{1}{2.54}$

$\frac{1 \text{ in}}{2.54 \text{ cm}}$ $\frac{2.2 \text{ lb}}{1 \text{ kg}}$

$H(x) = \left(\frac{x}{2.54}\right)$ $Ot(x) = \frac{x}{2.2}$

Chain Rule

$$\frac{d}{dx} f(x-a) = f'(x-a) \cdot 1$$

$$\frac{d}{dx} f(x)/1.35 = f'(x)/1.35$$

$$\frac{d}{dx} f(x/365) = f'(x/365) * 1/365$$

$$y = a * b^{x-c}$$

$$y' = a * b^{x-c} \cdot \ln b$$

GROUP NAME: Wolf Pack	Student Names (First and Last)
Logo:	Speaker/Presenter: Jared S.
Date: 9/25/13	Writer/Prep: Dominic C.
Topics:	QC/Leader: Quay
Instructions:	

YEARS		Kbps	Mbps
196	1996	14	0.014
98	1998	28	0.028
101	2001	56	0.056
103	2003	5000	5
106	2006	10000	10

X	Y_1	Y_2
1996	.00794	.00574
1998	.03375	.02442
2001	.29576	.214
2003	1.2572	.90965
2006	11.018	7.9722

$Y_1 =$

$Y_1 = [5.4109130053187E^{-30} * 2.061741953155^{(x-1900)}]$ /1000

$Y_2 = nDeriv(Y_1, x, x)$

The rate of change in 2013 is 1262.5 mb/s per year

GROUP NAME: Apples 2 Apples

Logo:

Date: 09/25/13

Topics:

Student Names (First and Last)

Speaker/Presenter: Steve H

Writer/Prep: ANNA S

QC/Leader: Steve H

Instructions: ~~Convert~~ [illegible] days [illegible] hours

Days | Hours

$$y = \left(3.40901466630375\sin\left(2.15987207 79059\left(\frac{x}{24}\right) - 1.22674821845 9\right) + 6.94849157796 46\right)\cdot 60$$

Hours | Minutes Daylight

Our derivative is changing minutes per hour.

At 420 hours we are losing [illegible] per hour.

GROUP NAME: The Scientistas

Logo: Science (jk, I love math)

Date: 9-25-13

Topics: Clan Ruie

Student Names (First and Last)

Speaker/Presenter: Nicole Pounau

Writer/Prep: Kiersten

QC/Leader: Dorin C

Instructions:

x (days after 2008)	y (ar[illegible] per day)	y (r[illegible])
1	1.653	1.5×10^{-4}
2	1.6536	[illegible]
[illegible]	1.6545	1.5×10^{-4}
[illegible]	1.6546	[illegible]
[illegible]	1.6548	[illegible]
[illegible]	1.6549	[illegible]
365	1.7069	$[illegible]\times10^{-4}$

$y_1 = 603.29(1.0327)^{[illegible] \cdot 365}$

$y_2 =$ [illegible]

1.65 [illegible] per day after [illegible] 2008 [illegible] of 1.5×10^{-4}

GROUP NAME: The factors

Logo:

Date: 9/25/13

Topics:

Student Names (First and Last)

Speaker/Presenter: Ryan Bigley

Writer/Prep: Kevin Chang

QC/Leader: Ethan Stewart

Instructions:

exp. regression

$y_1 = 6.157022756719 * 1.024507660726^{x}$

original regression

year	$
1950	1.968
1960	2.5072
1970	3.194
1980	4.069
1990	5.1837
2000	6.0638

$y = 6.157022756719 * 1.024507660726^{(x+1900)}$

$y = 6.157022756719 * 1.024507660726^{(x+1900)}(12.9x)$

x + 1900 in years	billion of peso y	billion of peso year
50	25.466	.61659
60	32.443	.78551
70	41.333	1.0007
80	52.653	1.2748
90	67.077	1.6241
100	85.453	2.069

100 years after 1900, the U.S is spending 2.069 billion peso's more than the previous year

GROUP NAME: IRISH MATH BOMBS

Logo: 

Date: _____

Topics:

Student Names (First and Last)

Speaker/Presenter: Bill Smith ~~Connor Kraysman~~

Writer/Prep: Bobby O'Connor

QC/Leader: ~~Bobby Smith~~ Connor Kraysman

Instructions:

x	y 1	y 2
2003	123.34	.90542
2005	125.03	.83598
2007	126.81	.94709
2009	128.78	.98876
2011	130.55	.71098
2013	131.24	-.1362

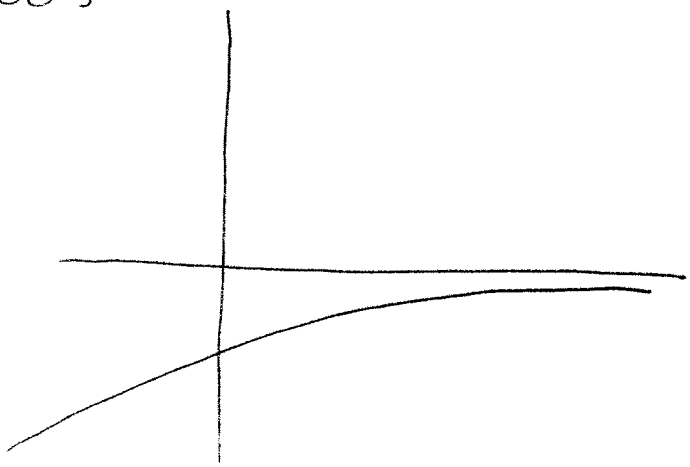
Original

x	y
3	13
5	15
7	16
9	19
11	20
13	21

In 2013 (rear) The price of PBR is Dropping at -.1362 pesos per year.

American Dollars to pesos and years to 2000's

Pesos



PROF. PORTER

MATH CLASSWORK

GROUP NAME: Time Is Money

Logo: 

Student Names (First and Last)

Speaker/Presenter: Angelika Mazurek

Writer/Prep: Shviam Singh (Shiv)

QC/Leader: Eugenio Pelaez

Date: 09/25/13

Topics: Chain Rule

Instructions:

Sale of IPhone 4S

STAT 1: EDIT

L_1	L_2
1	600
2	350
3	200
4	199
5	250

← original data

Y_1 = VARS 5: STATISTICS > > ENTER

$Y_1 = 583.041825 \ldots x^{.7432} \ldots N/(x/365)$

$Y_2 = nDeriv(Y_1, x, x)$

2nd Table

X	Y_1 per year in €	Y_2 per day in €
365	342.61	-.2174
720	273.52	-.1735
1085	216.99	-.1377

IPhone 4S sale is decreasing at a rate of -.2174 euros per 365 days

GROUP NAME: CSC

Logo:

Date: ~~9/25~~ 13

Topics: Apple Stock Prices $

Student Names (First and Last)

Speaker/Presenter: Cornell

Writer/Prep: Courtney

QC/Leader: Stephen

Instructions:

expReg

34.346597322505 • 1.24356326 12487 (X/365)

L1	L2
9	211.98
10	336.12
11	405
12	532.17
13	501.02

X	Y1	
0	34.347	beginning
365	42.712	1 YR
730	53.115	2 YR
1095	65.659	3 YR
1460	82.14	4 YR
1825	102.15	5 YR

US $ into euros

365	31.639 .01889
730	39.345 .0235
1095	48.928 .02922
1460	60.845 .03634
1825	75.669 .04519
0	25.442 .01519

	Y2
0	.00051
365	.02551
730	.03172
1095	.03921
1460	.04905
1825	.061

GROUP NAME: Math Letes	**Student Names (First and Last)**
Logo: 	**Speaker/Presenter:** Logan Hoekenbrs
Date: _____	**Writer/Prep:** Adam Callahan
Topics:	**QC/Leader:** Kyle Inverso

Instructions:

Take f' and Change rates

Costs of repairs Quarterly by grade

Divided all x by 4 to get Quarterly

Divided Y_1 by 1000 for repairs

for .01 grade

derivative is the change of cost per Quarterly

X	Y_1	Y_2
1927	-1,163	$4,2 \times 10^{-4}$
1937	-1,163	"
1967	-1,15	"
1997	-1,138	"

Y_2 is linear