Transcendal Function

e^x, a^x, $\ln(x)$, $\log(x)$, $\sin(x)$, $\cos(x)$, $\tan(x)$

Rules

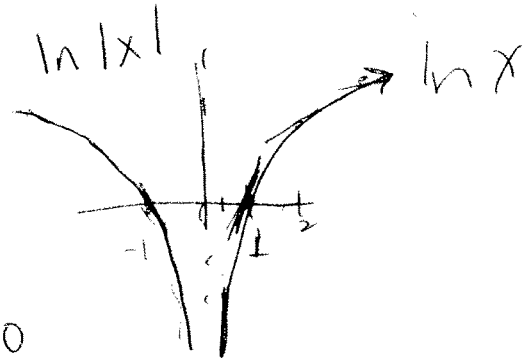
$$\frac{d}{dx} e^x = e^x$$

$$\frac{d}{dx} a^x = a^x \ln a$$

Ex $y = 3^x$

$y' = 3^x \cdot \ln 3$

$$\frac{d}{dx} \ln(x) = \frac{1}{x} \quad x>0$$



$$\frac{d}{dx} \ln|x| = \frac{1}{x} \quad x \neq 0$$

$$\frac{d}{dx} \log_b x = \frac{1}{x \ln b}$$

Ex $y = \log x$

$y' = \frac{1}{x \ln 10}$

$$\frac{d}{dx} \sin(x) = \cos(x)$$

$$\frac{d}{dx} \cos(x) = -\sin(x)$$

$$\frac{d}{dx} \tan(x) = \sec^2(x)$$

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

Ex $\frac{d}{dx}\frac{\sin(x)}{\cos(x)} = \frac{\cos(x)\cdot\frac{d}{dx}\sin(x) - \sin(x)\cdot\frac{d}{dx}\cos(x)}{\cos^2 x}$

$= \frac{\cos(x)\cdot\cos(x) \overset{+}{-} \sin(x)\sin(x)}{\cos^2 x} =$

$= \frac{\sin^2(x) + \cos^2(x)}{\cos^2 x} = \frac{1}{\cos^2 x} = \sec^2 x$

$\frac{d}{dx}\tan(x)$

Ex $\frac{d}{dx}\, e^x \cdot \tan x =$

$e^x \cdot \frac{d}{dx}\tan x + \tan x \cdot \frac{d}{dx} e^x$

$e^x \sec^2 x + \tan x \cdot e^x$ ✓

$e^x \sec^2 x + e^x \tan x$

$e^x(\sec^2 x + \tan x)$

First Derivative

y', $\frac{dy}{dx}$, D_x, $\frac{d}{dx}f$ ← Slope of Tangent Line (Velocity)

calc 6: dy/dx nderive(Y1, X, X)

Second Derivative

y'' $\frac{d^2y}{dx^2}$, D_{xx}, $\frac{d}{dx}\frac{d}{dx}f$ ← How 1st Derivative is changing (acceleration)

nderive(nderive(Y1, X, X))

Third Derivative ← Jerk.

y''' $\frac{d^3y}{dx^3}$, D_{xxx}, $\frac{d}{dx}\frac{d}{dx}\frac{d}{dx}f$

More Derivatives

Quotient Rule

$$y = \frac{P(x)}{q(x)} \qquad y' = \frac{q(x)\,P'(x) - P(x)\,q'(x)}{q(x)^2}$$

Ex $$y = \frac{x^2 - 2x + 7}{3x^5 + 9x}$$

$$y' = \frac{(3x^5+9x)\cdot\frac{d}{dx}(x^2-2x+7) - (x^2-2x+7)\frac{d}{dx}(3x^5+9x)}{(3x^5+9x)^2}$$

$$= \frac{(3x^5+9x)(2x-2) - (x^2-2x+7)(15x^4+9)}{(3x^5+9x)^2}$$

DONE

(could do more... but don't.

Product Rule

$$y = P(x)\cdot q(x) \qquad y' = Pq' + qP'$$

Ex $$y = (x^5+2x+8)(x^9-x^2)$$

$$(x^5+2x+8)\frac{d}{dx}(x^9-x^2) + (x^9-x^2)\frac{d}{dx}(x^5+2x+8)$$

$$(x^5+2x+8)(9x^8-2x) + (x^9-x^2)(5x^4+2)$$

Exponential Regression

$y = .19\ldots \cdot 1.29\ldots^{x}$

$y' = .19\ldots * 1.29\ldots^{x} * \ln(1.29\ldots)$

Growing 1.4 mil per year in 2013

Ln Regression $a + b\ln x$

$y = -9.9\ldots + 5.55 \ln x$

$y' = 5.55 \cdot 1/x$ .42 per m 2013

~~Sin Regression~~

~~$y = a\sin(bx + c) + d$~~

~~$y' = a\cos$~~

GROUP NAME: The Scientists	**Student Names (First and Last)**
Logo:	**Speaker/Presenter:** Nicole Pownall
Date: 9-23-13	**Writer/Prep:** Dorin Ciocotisan
Topics: Math	**QC/Leader:** Kiersten Hendricksen

Instructions: Exponential and Ln Regressions of extinct species

Exponential Regression: STAT CALC ExpReg

X	Y
14	30.467

$y = 603.29 * 1.03^x$

$y' = 603.29 * 1.03^x * \ln(1.03)$

We predict that by the year 2019, the number of extinct species will increase by 30.467 according to the exponential regression

Ln Regression STAT CALC LnReg

X	Y
14	20.056

$y = 190.90 + 280.79 \ln x$

$y' = 280.79 \frac{1}{x}$

We predict that by the year 2019, the number of extinct species will increase by 20.056 according to the Ln regression.

GROUP NAME: The factors

Logo:

Date: 9/23/13

Topics: Ln, exponential regression

Student Names (First and Last)

Speaker/Presenter: Ryan Bigley

Writer/Prep: Kevin Chávez

QC/Leader: Ethan Stewart

Instructions: government spending on infastructure

exponential regression

$y = a \times b^x$

$y = 6.157022705699 * 1.024507660726^x$

$y' = 6.157022705699 * 1.024507660726^x * \ln(1.024507660726)$

in 2013 using exponetail regression the gov. will be increasing there speriding by .21904 billion per year

Ln regression

$y = a + b \ln x$

$y = -1816.448605174 + 239.9452967503 \ln(x)$

$y' = \frac{239.9452967503\ (1)}{x}$

in 2013 using Ln regression the gov. will be increasing there spending by .1192 billion per year

GROUP NAME: CSC

Logo:

Date: 9/23/13

Topics: exp. & ln

Student Names (First and Last)

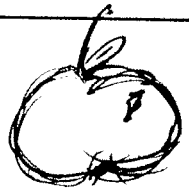
Speaker/Presenter: stephens.

Writer/Prep: courtney G.

QC/Leader: corneal D.

Instructions:

apple stock prices



years: 2009-2014

Ln Reg

$y = a + b \ln x$

$a = -1183846.494$

$b = 155690.7018$

$y' = \frac{155690.7018}{x}$

in 2014 stock prices will go up by $160.95

exp. Reg

$y = a \cdot b^x$

$a = 34.34105973 2$

$b = 1.243563261$

$y' = 34.34\ldots \times 1.24\ldots^x \times \ln(1.24\ldots)$

in 2014 apple stock prices will raise by $158.36

PROF. PORTER

MATH CLASSWORK

GROUP NAME: Time Is Money

Logo: 

Date: 9/23/13

Topics:

Student Names (First and Last)

Speaker/Presenter: Angelika Mazurek

Writer/Prep: Shviam Singh (Shiv)

QC/Leader: Eugenio Pelaez

Instructions: Exp. Reg
Ln Reg.

IPhone 4S Sales

① STAT CALC
Exp Reg

$Y_1 = 583.041\ldots \times .79329^x$

X	Y_1
3	-67.4

In 3 years IPhone 4S Sale decreases by $ -67.4.

② STAT CALC
Ln Reg

Y_1 = delete (a) & (x and divide by x.

X	Y_1
3	-80.57

In 3 Years IPhone 4S Sales decreases by $ -80.57.

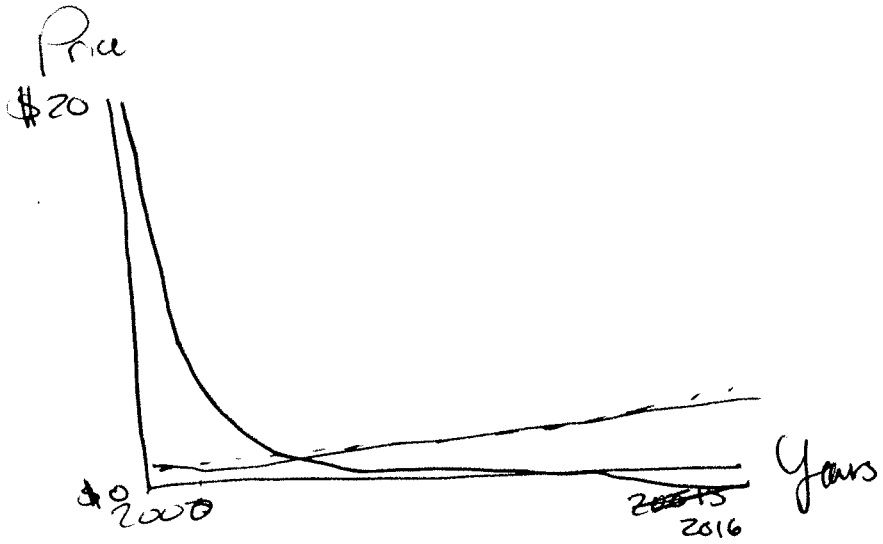
GROUP NAME: Irish Math Bombs	Student Names (First and Last)
Logo:	Speaker/Presenter: Connor
Date:	Writer/Prep: Connor
Topics:	QC/Leader: Connor

Instructions:

exp Regression - y_1

ln Regression - y_2

PBR OVER LAST 10 YEARS



In the year 2015, based on exponential ~~findings~~ Regression, the price of PBR will be going up by $1.18 per year

$\frac{d}{dx} e^{x} = 11.542x...(1.0502...)^{x}$

$\ln(1.0502...)$

$\frac{d}{dx} \ln = (5.647752055 4398)(1/x)$

Based on ln Regression, the price of PBR will be growing by $0.38 per year

GROUP NAME: apples 2 apples	**Student Names (First and Last)**
Logo:	**Speaker/Presenter:** THOMAS Y
Date: 09/23/13	**Writer/Prep:** ANNA S
Topics:	**QC/Leader:**

Instructions: Derivative of the transcendental functions

$\exp_a(x) = a^x$

$\frac{d}{dx}[a^x] = a^x(\ln a)$

$= 2.0625^x \cdot \ln(2.0625)$

$\frac{dy}{dx}[1] = 13.825$ at day one sleep is changing by 13.825 hours per day

HOURS

1

DAYS

$\frac{d}{dx}[e^x] = e^x$

$\frac{d}{dx}[e^1] = 1$

at day one sleep is changing by 1 hour per day

1

DAYS

GROUP NAME: Mathletes **Logo:** 	**Student Names (First and Last)** **Speaker/Presenter:** Kyle Inverso **Writer/Prep:** Aidan Callahan **QC/Leader:** Logan Hackenbury
Date: 9/23/13 **Topics:** Regressions (Derivative of exponential functions)	

Instructions:

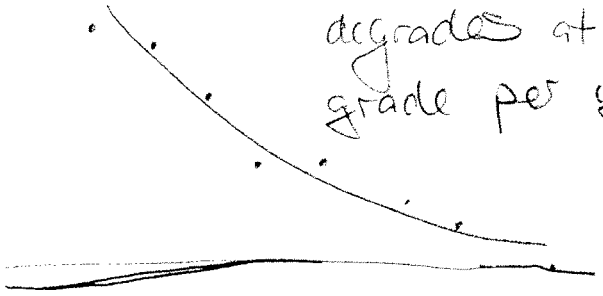
$y = 2.623326855559 1 \times 10^{25} * .970305^{639148^{x}}$

$y_2 = 2.623.... \times 10^{25} * .970305 (\ln(.970305))$

In 2014 the bridge degrades at -.014 grade per year

$a \cdot b^x$

x	y_1	y_2
20	-4×10^{-2}	1.1×10^{-2}



$\frac{1}{x}$

x	y_1	y_2

GROUP NAME: Wolf Pack	**Student Names (First and Last)**
Logo:	**Speaker/Presenter:** Quayshawn J
Date: 9/23/13	**Writer/Prep:** Jared S.
Topics:	**QC/Leader:** Dominic C.

Instructions:

Speed of Internet
in kb/s

X	Y_1	Y_2
1996	$1.1e^{30}$	1044.5
1998	$4.5e^{30}$	1023.2
2001	$4e^{31}$	992.79
2003	$1.7e^{32}$	973.52
2006	$1.5e^{33}$	945.96
2014	$4.8e^{35}$	879.58

$Y_1 = 2.061741953155 4^{X} \cdot \ln(2.061741953155 4)$

$Y_2 = \frac{100272.28993769}{X}$

The speed of the internet is increasing with the exp While the speed is increasing less with ln