151 h.
d13

Newton's Method

use to find zeros

$$x^4 - 3x^2 - 5x + 7 = 0$$

$Y_1 = X^4 - 3X^2 - 5X + 7$

(Guess = 3)

$3 \xrightarrow{STO} X$

$X - Y_1 / \text{nDeriv}(Y_1, X, X) \xrightarrow{STO} X$

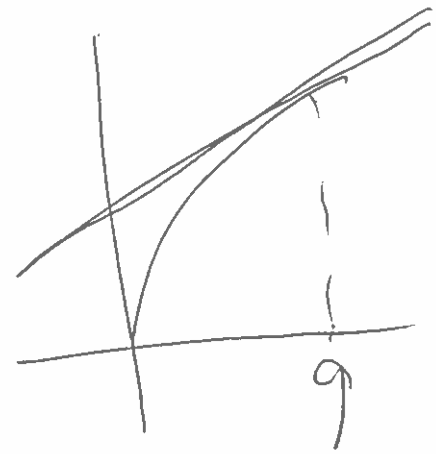
ENTER

⋮

Linearizing

$f(x) = \sqrt{x}$

Solve $\sqrt{12}$



Konnect

$\sin\left(\frac{11}{4}\right)$ $\qquad \frac{11}{4} \approx \pi$

Point $(\pi, \sin\pi)$

$(\pi, 0)$

Slope of tangent line

$f(x) = \sin(x)$

$f'(x) = \cos(x)$

$f'(\pi) = \cos(\pi)$

$m = -1$

$y - 0 = -1(x - \pi)$

$y = -x + \pi$

$\sin\left(\frac{11}{4}\right) = -\frac{11}{4} + \pi$

L'Hôpital Rule "LO PEE JAL"

$$\lim_{x \to a} \frac{f(x)}{g(x)} = \frac{0}{0} \text{ or } \frac{\infty}{\infty}$$

Then.

$$\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$$

Ex $\lim_{x \to 0} \frac{\sin x}{x} = \frac{0}{0}$ use LHR

$$= \lim_{x \to 0} \frac{\cos x}{1} = \cos(0) = 1$$

Ex $\displaystyle\lim_{x\to\infty} \frac{3x^2-5x}{4x^2+7} = \frac{\infty}{\infty}$ use LHR

$$= \lim_{x\to\infty} \frac{6x-5}{8x} = \frac{\infty}{\infty} \text{ use LHR}$$

$$= \lim_{x\to\infty} \frac{6}{8} = \frac{3}{4}$$

$$0, \qquad 1, \qquad \infty$$

$$0 \cdot \infty =$$

$$\downarrow \quad \downarrow$$

$$\lim_{x\to\infty} \frac{3}{\cancel{x^{23}}} \cdot \cancel{x^{23}} = 3$$

$$\lim_{x\to\infty} \underset{0}{\frac{1}{4x^2+7}} \cdot \underset{\infty}{3x^2-5x} = \frac{3}{4}$$

$0 \cdot 0$ ✓

$0 \cdot 1$ ✓

$0 \cdot \infty$ = UNKNOWN

$1 \cdot 0$ ✓

$1 \cdot 1$ ✓

$1 \cdot \infty$ ✓

$\infty \cdot \infty$ ✓

$\infty \cdot 0$ – UNKNOWN

$\infty \cdot 1$ ✓

$0/0$ – UNKNOWN

$0/1$ ✓

$0/\infty$ ✓

$1/0$ – $\pm\infty$

$1/1$ ✓

$1/\infty$ – 0

∞/∞ – UNKNOWN

$\infty/1$ ✓

$\infty/0$ – $\pm\infty$

$\infty - \infty$?? UN

$1^0 = 1$

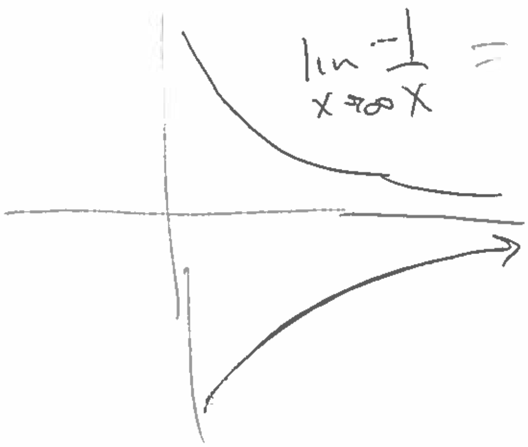
$1^1 = 1$

$1^\infty = .99^\infty = 0$

$1.{-} = 1$

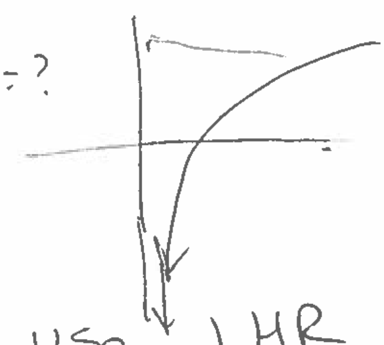
$1.01^\infty = \infty$

UNKNOWN



$$\lim_{x \to \infty} \frac{-1}{x} \cdot x^2 = -\infty$$

Ex $\lim_{x \to 0^+} x \ln x = 0 \cdot -\infty = ?$



$$\lim_{x \to 0^+} \frac{\ln x}{x^{-1}} = \frac{-\infty}{\infty} \quad \text{USE LHR}$$

$$= \lim_{x \to 0^+} \frac{1/x}{-x^{-2}} = \lim_{x \to 0^+} -x = 0$$

$\underline{\text{Ex}}$ $\lim\limits_{x \to \infty} \left(1 + \frac{R}{x}\right)^{x\,T} = 1^{\infty}$ unknown

$$e^{\ln x} = x$$

$$\ln\left(\lim_{x \to \infty} \left(1 + \frac{R}{x}\right)^{x}\right)$$

$$e^{\lim\limits_{x \to \infty} \ln\left(1 + \frac{R}{x}\right)^{x}}$$

$$e^{\lim\limits_{x \to \infty} \underset{\infty}{x} \cdot \underset{0}{\ln}\left(1 + \frac{R}{x}\right)}$$

$$e^{\lim\limits_{x \to \infty} \frac{\ln\left(1 + \frac{R}{x}\right)}{x^{-1}}} = \frac{0}{0} \text{ USE LHR}$$

$$e^{\lim\limits_{x \to \infty} \frac{\frac{1}{\left(1 + R/x\right)} \cdot \frac{d}{dx}\left(R/x\right)}{\left(d/dx\, 1/x\right)}}$$

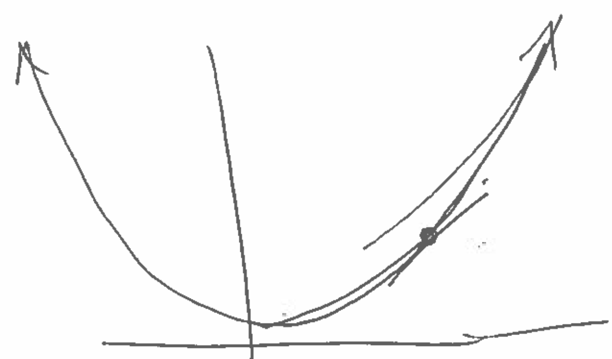
$$e^{\lim\limits_{x \to \infty} \frac{R}{1 + R/x}} = e^{R\,T}$$

Second Derivative

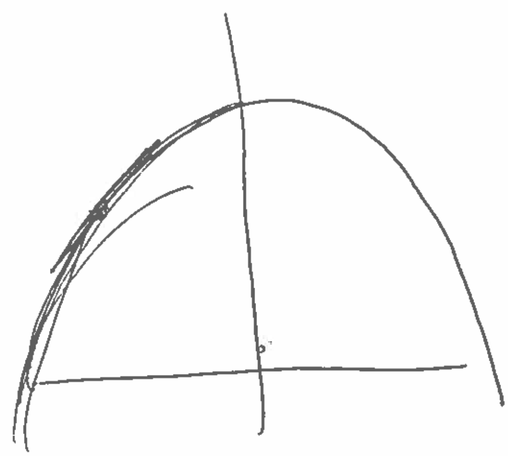
Function y'' $\quad \dfrac{d^2y}{dx^2}$ $\quad D_{xx}$ $\quad f''(x)$

Value $y''(a)$ $\quad \left.\dfrac{d^2y}{dx^2}\right|_{x=a}$ $\quad D_{xx}(a)$ $\quad f''(a)$

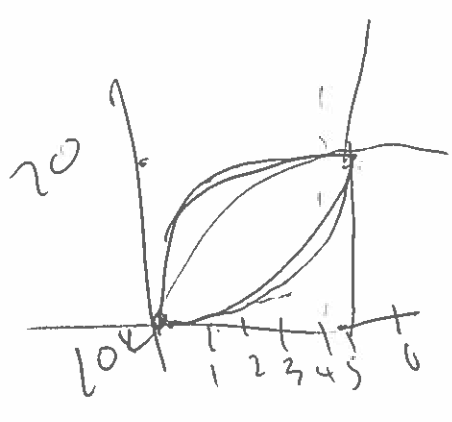
Concavity



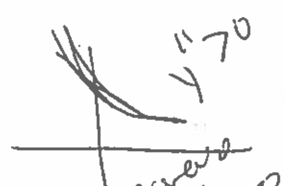
Concave up

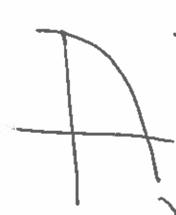


Concave down



"Lady G is decreasing constantly ??"





GROUP NAME: P. Minions Date: 3/11	Student Names (First and Last) Speaker/Presenter: Jason Writer/Prep: Dallen Leader/Collaborator:
Independant Variable (x-axis): Years Dependant Variable (y-axis): Moneys	

Conclusion (in words): In 2014 tuition prices will rise without hope!

Supporting Work:

$Y_1 = -.0833\ldots x^3 + 20.999\ldots x^2 - 417.916\ldots + 5464.1999\ldots$

$Y_2 = \text{nDeriv}(Y_1, x, x)$

$Y_3 = \text{nDeriv}(Y_2, x, x)$

X	Y_1	Y_2	Y_3
14	3500.7	121.08	35
	\$	\$/yr	\$/yr/yr

GROUP NAME: Porter's minions

Date: March 11, 2014

Independant Variable (x-axis): years

Dependant Variable (y-axis): tuition

Student Names (First and Last)

Speaker/Presenter: Kero

Writer/Prep: Jenn

Leader/Collaborator: Daniella

Conclusion (in words):

In 2014 tuition prices will rise with hope

Supporting Work:

quartic

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

$y_2 = \text{nDeriv}(y_1, x, x)$

$y_3 = \text{nDeriv}(y_2, x, x)$

increasing
concave
down

x	y_2	y_3
14	91.917	-44.91
	\$/yr	\$/yr/yr

GROUP NAME: Fluffy Ponies

Date: 3/11/14

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

Conclusion (in words):

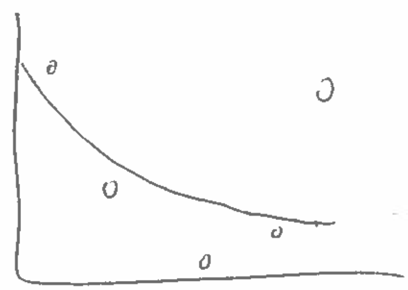
At \$70K, your chance of committing a crime is decreasing, but levels off (by .14)

Supporting Work:

lnreg:

$a = .6825\ldots$

$b = -.1013\ldots$



~~y = .6825x .1013~~

$y_1 = .6825\ldots - .1013\ldots \ln x$

$y_2 = \text{nDeriv}(y_1, x, x)$

$y_3 = \text{nDeriv}(y_2, x, x)$

x	y_1	y_2	y_3
70	.25208	-.0014	2.1×10^{-5}
	%	%/yr	%/yr/yr

the rate is going up
and by the rate is going up is
going also up

without hope
concave
concave

GROUP NAME: INTERNATIONAL AVENGERS!!

Date:__________

Student Names (First and Last) Ahmed & June

Speaker/Presenter: Ahmed & June

Writer/Prep: Ahmed & June

Leader/Collaborator: Tyler

Independant Variable (x-axis): salary per thousand

Dependant Variable (y-axis): Crime rate

Conclusion (in words):

At 70K crime rate is increasing without hope because it's concave up and is going up

Supporting Work:

$Y_1 =$ Quartic Reg.

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

$Y_3 =$ nDeriv(Y_2, X, X)

Quartic Reg

$y = ax^4 + bx^3 + \ldots + e$

$a = -1.041\ldots E^{-8}$

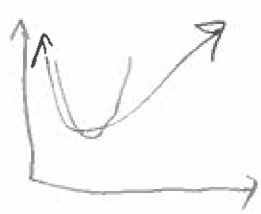
$b = 2.916\ldots 7E^{-8}$

$c = -9.58\ldots E^{-5}$

$d = -.01266\ldots 7$

$e = .74$

X	Y_2	Y_3
70	.0025	$4.2E^{-4}$
	Increa	Without Hope



PROF. PORTER MATH CLASSWORK S14

GROUP NAME: W. H. O. Date: 3/11/14	Student Names (First and Last)
Independant Variable (x-axis): years Dependant Variable (y-axis): steroid levels	Speaker/Presenter: Michael Writer/Prep: Charles Leader/Collaborator: Cathryn

Conclusion (in words):

In the current year of 2014, the steroid levels in ppm of the cubic regression are decreasing at the rate of 69.54 ppm per year and will continue to decrease forever after this year.

Supporting Work:

Data

X	Y
0.01	122
3	100
6	143
9	200
12	170

$y = ax^3 + bx^2 + cx + d$

$a = -0.4701035709$

$b = 8.450773849$

$c = -29.73944721$

$d = 123.0101337$

$Y_2 = \text{nderiv}(y_1, x, x)$

$Y_3 = \text{nderive}(y_2, x, x)$

X	Y_2	Y_3
14	-69.54	-22.59

ppm/yr ppm/yr/yr

GROUP NAME: WHO (save the babies ☺)

Date: 3/11/14

Student Names (First and Last)

Speaker/Presenter: kathleen

Writer/Prep: Jenna Garofalo

Leader/Collaborator: Catherine

Independant Variable (x-axis): years

Dependant Variable (y-axis): steroid in food in babies (ppm)

Conclusion (in words): in 2017 and after this, the steroid level in food in babies is going on a constant increasing slope up.

Supporting Work:

x	y
0.01	122
3	100
6	143
9	200
12	170.

Sin Reg

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

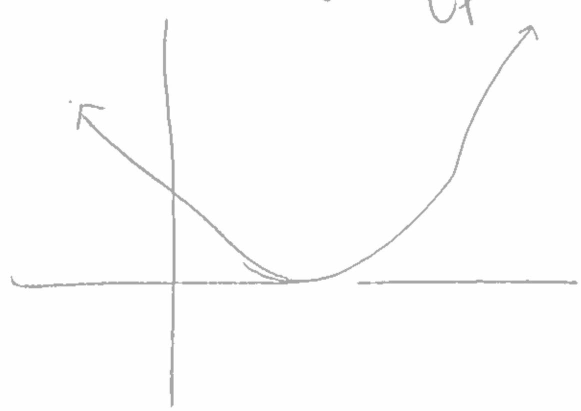
$a = 51.49869637$

$b = 0.443199559$

$c = -2.666224053$

$d = 147.019251 3$

concave up



$y_1 = \text{SinReg}$

$y_2 = \text{nDeriv}(y_1, x, x)$

$y_3 = \text{nDeriv}(y_2, x, x)$

X	Y1	Y2	Y3
~~11~~	~~127.41~~	~~-21.05~~	~~3.911~~
17	96.148	3.541	9.9932