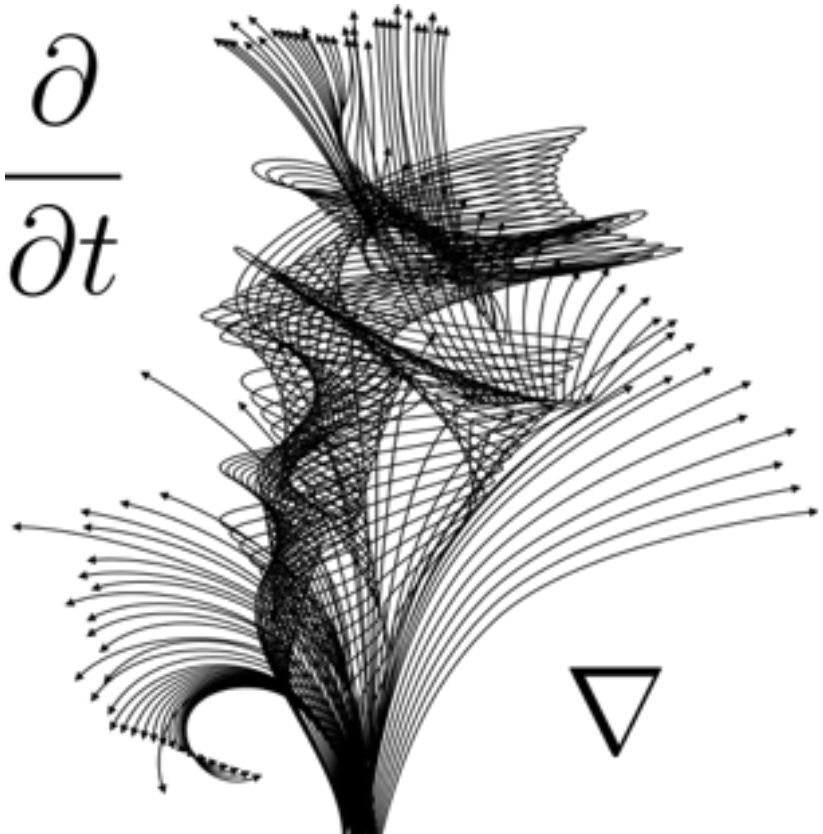
Differential Calculus with Applications to Life Sciences

Math 102:105

Pooya Ronagh

Agenda for today:

- Review inverse functions
- Log plots
- Decays and Growths
- More differential equations



Last time…

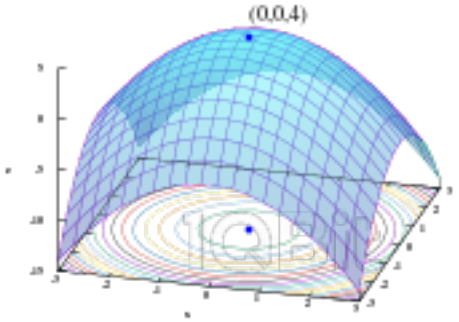
Which of the following functions has an inverse?

(A) x^2

(B) x^3

(C) $x^4 - x^2$

(D) $\dfrac{1}{x^2}$



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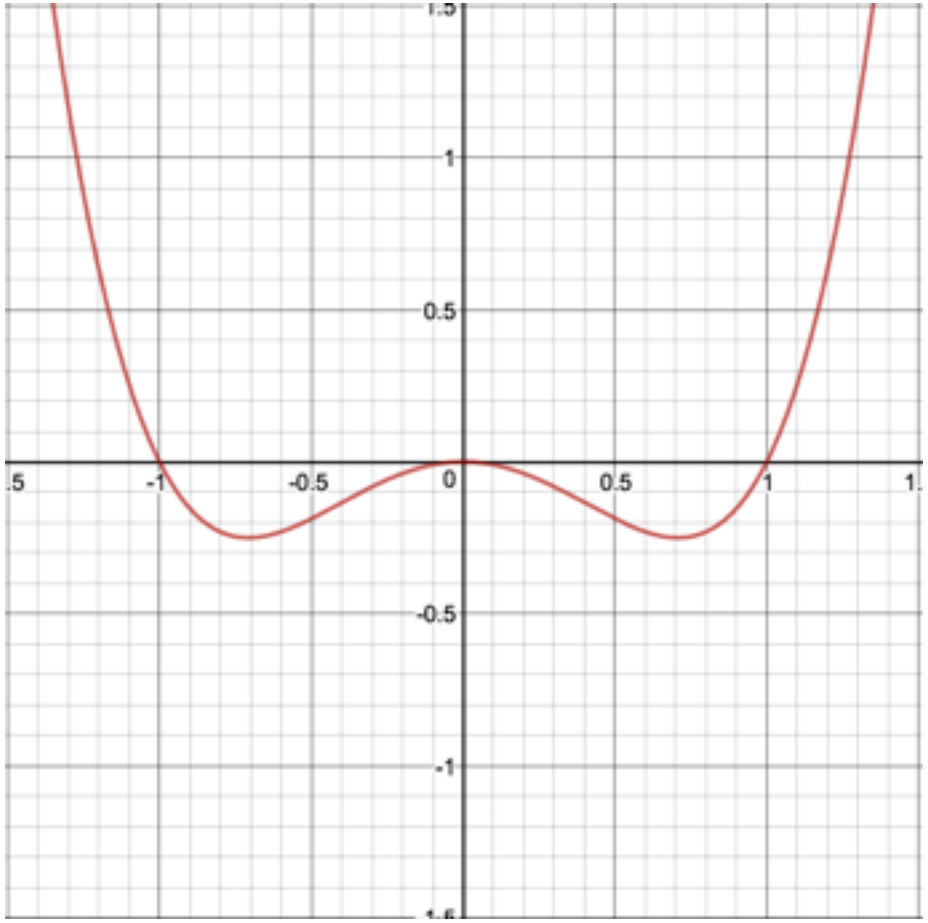

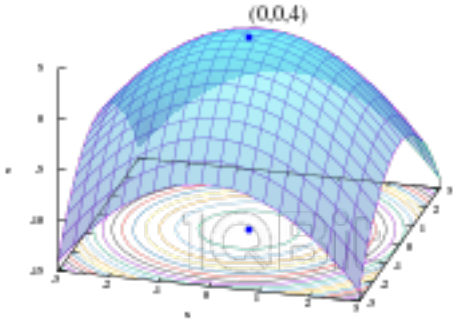

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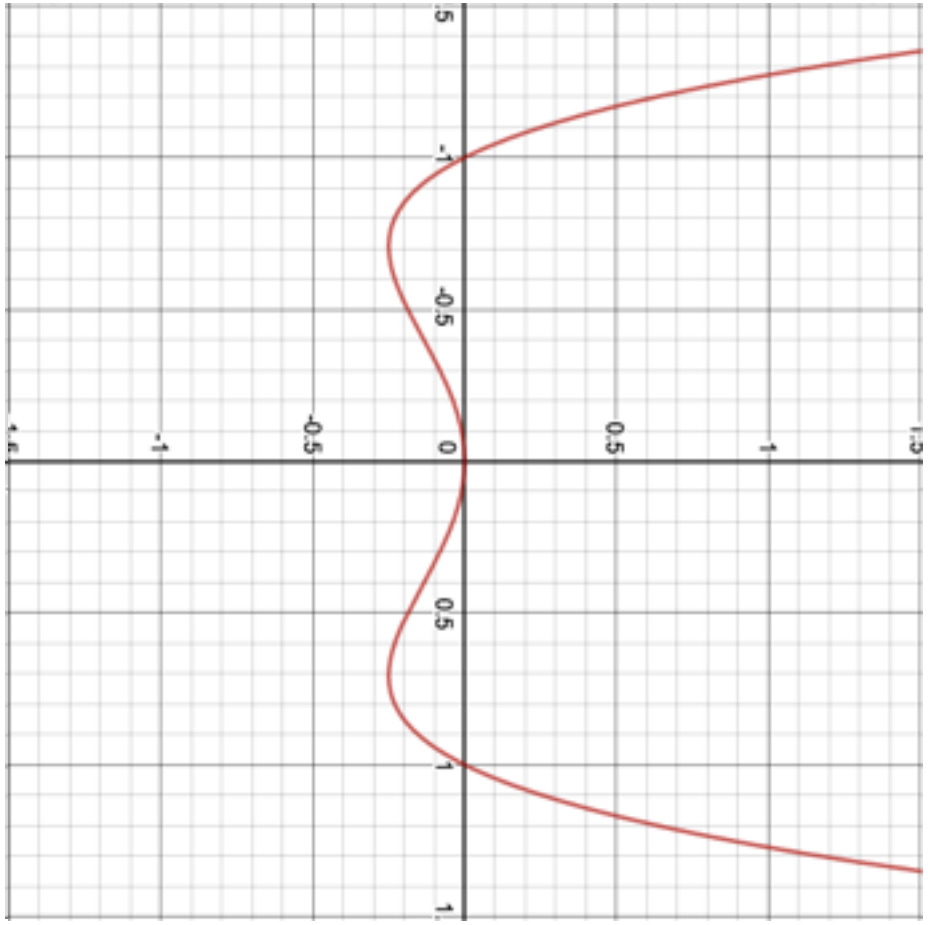
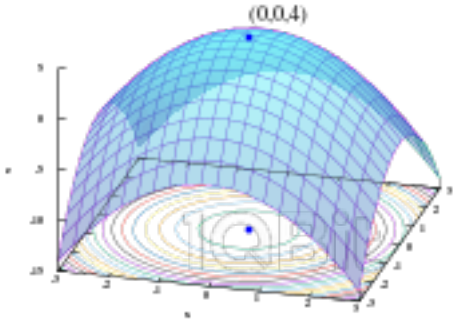




Last time…

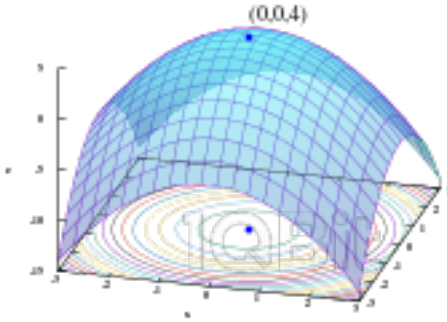
Which of the following identities is correct?

$$(A) \quad \log_2(8) = 2$$

$$(B) \quad \log_e(e^2) = 1$$

$$(C) \quad \ln(e) = 0$$

$$(D) \quad \log_3(3) = 1$$



Last time…

What is the derivative of $f(x) = 3^x$?

$(A) \quad 3^x$

$(B) \quad C_3\, 3^x$

$(C) \quad \frac{1}{3} 3^x$

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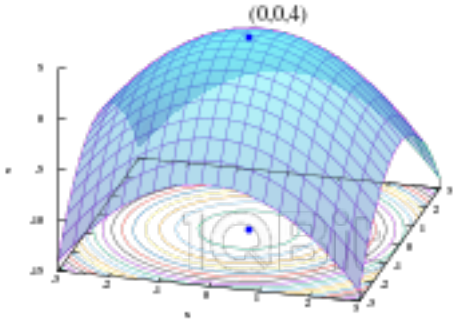

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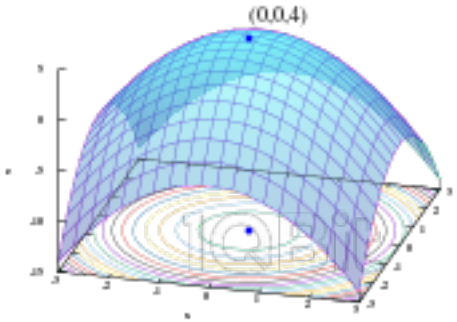
Key step:

$$3 = e^{\ln(3)}$$

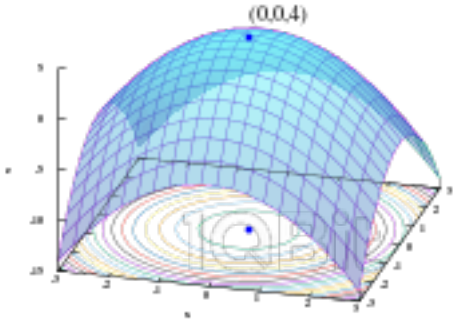


Semi-log plots

Goal: verify that some data set collected from an environment follows an exponential trend:

$$y = ae^{kx}$$

and find values of a and k.



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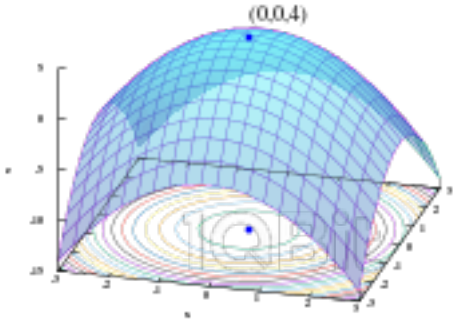

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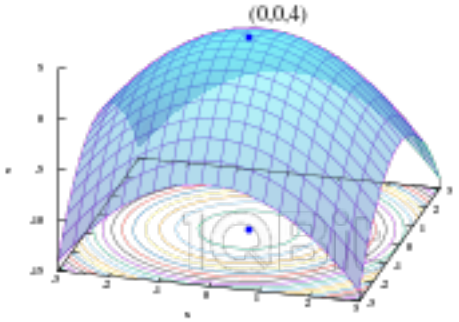
If $y = ae^{kx}$ is the relationship expressing y in terms of x, then

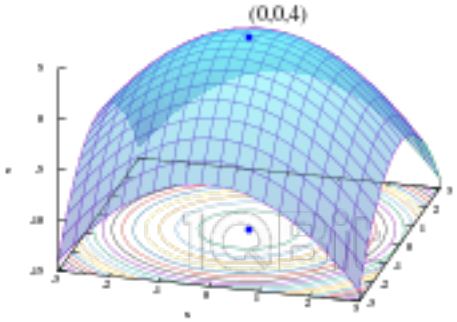
$$z = \ln(a) + kx$$

is the relationship expressing z in terms of x.



Doubling time

Remember the magic drop …

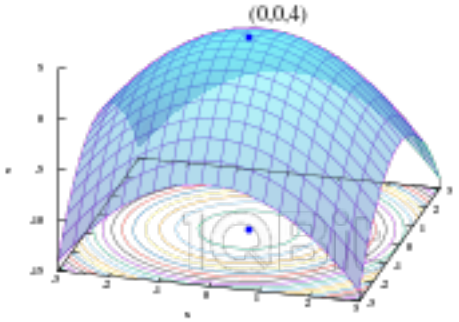


Doubling time

Remember the magic drop with volume 0.05mL.
The bowl of the Millennium Stadium with volume 1.5million metres cubed.

Calculate the exact time at which the entire Stadium is under water.

(A) 44.33 seconds
(B) 44.55 seconds
(C) 44.77 seconds
(D) 44.99 seconds



See you next week!

Nov 3	WW 8
Nov 7	PL10.1
Nov 9	PL10.2