

# CLASS 4

## BAYESIAN VS FREQUENTIST APPROACHES TO STATISTICAL INFERENCE

HOPE EVERYONE IS OK AFTER THIS  
TRAUMATIC EXPERIENCE </3

### Top stories :

Facebook, Instagram restored after widespread outage >



... BBC

Facebook and Instagram restored after outages

19 hours ago

The Independent

Facebook, Instagram.

Variety

Facebook, Instagram Hit by Outage: Thousands of Users Reported Problems...

22 hours ago

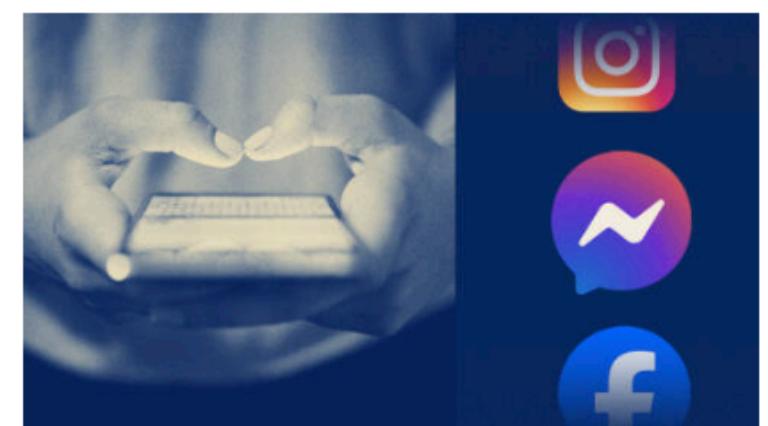
CNN

Facebook and Instagram outage: Widespread disruption resolved

19 hours ago

The Guardian

Facebook



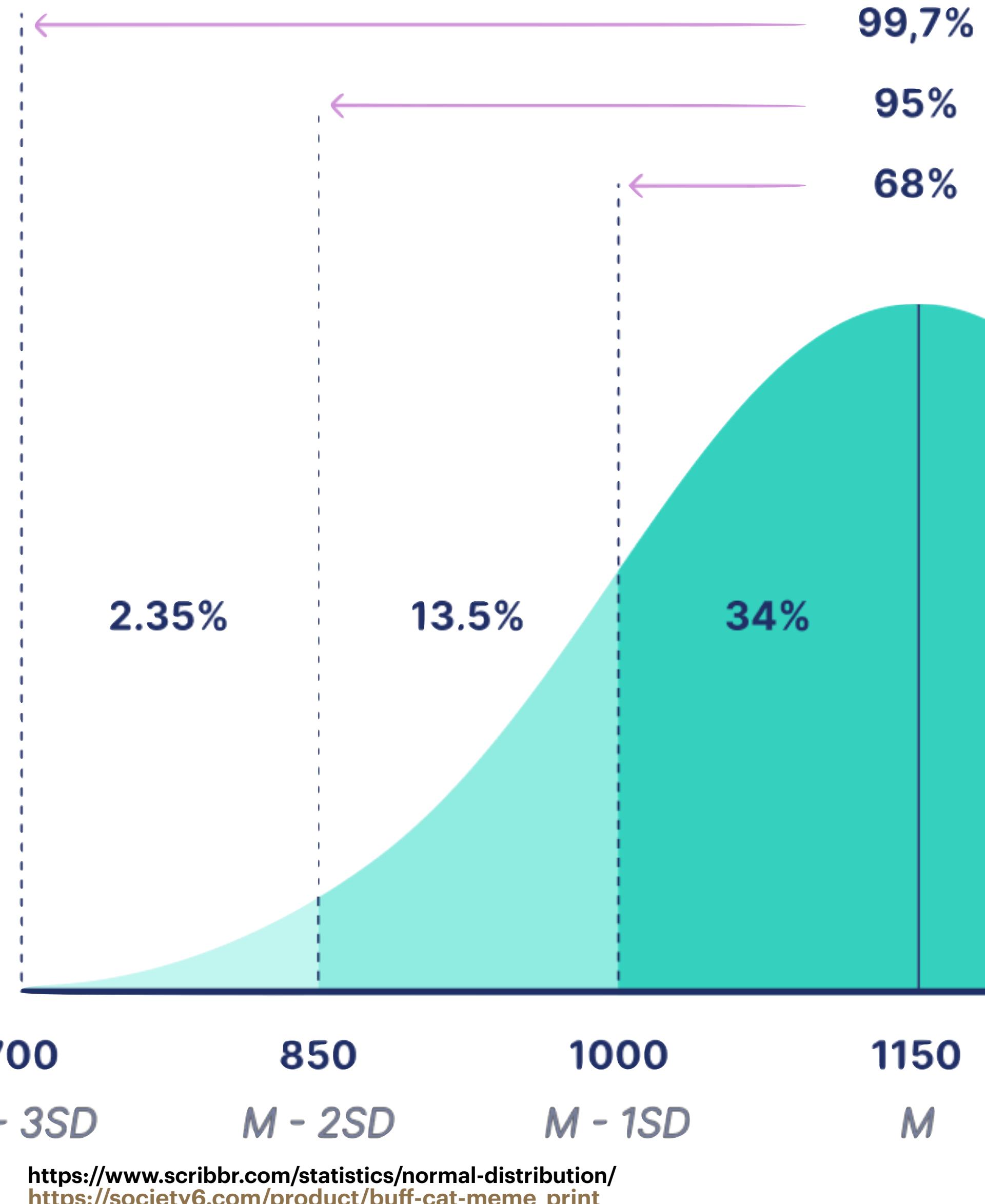
UDLAND

I to timer var 'fuldstændig central infrastruktur' ude af drift. Og det kommer til at ske igen, siger korrespondent

[HTTPS://WWW.DR.DK/](https://www.dr.dk/)

# AGENDA

- Starting a **rulebook** for math operations
- Exercises 
- Portfolio work, if time



# Powers

## Zero property

$$x^0 = 1$$

## One property

$$x^1 = x$$

## Power notation

$$\text{power}(x, a) = x^a$$

## Fraction Property

$$\left(\frac{x}{y}\right)^a = \left(\frac{x^a}{y^a}\right) = x^a y^{-a}$$

$b^n$

base • power

When  $n$  is a positive integer, exponentiation corresponds to repeated multiplication of the base.

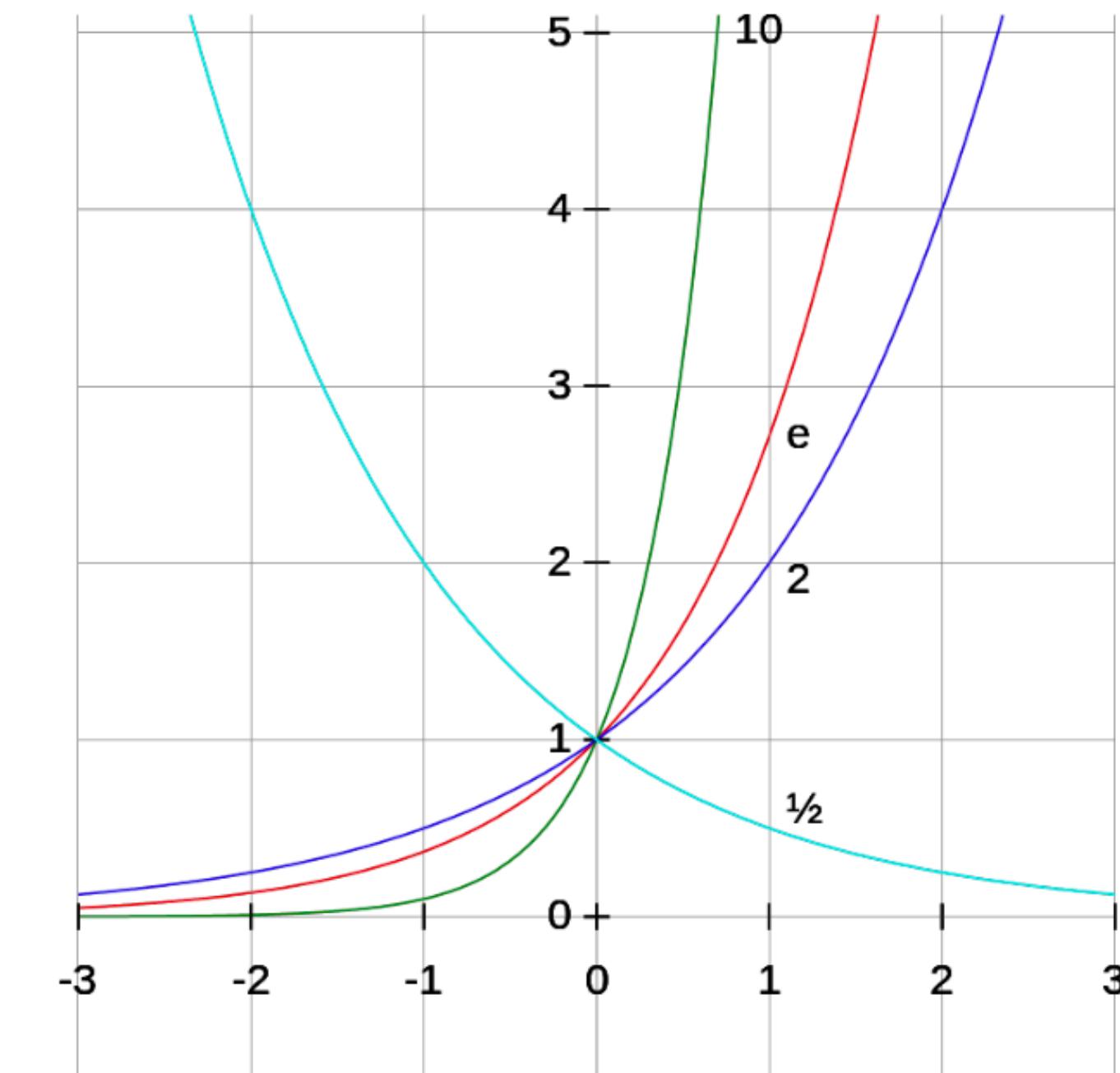
$$b^n = \underbrace{b \times b \times \cdots \times b \times b}_{n \text{ times}}$$

## Nested Exponents

$$(x^a)^b = x^{ab}$$

## Distributive Property

$$(xy)^a = x^a y^a$$



## Product Property

$$x^a * x^b = x^{a+b}$$

## Ratio Property

$$x^{\frac{a}{b}} = (x^a)^{\frac{1}{b}} = \left(x^{\frac{1}{b}}\right)^a = \sqrt[b]{x^a}$$

# Logarithms

The logarithm of a number  $x$  to the base  $b$  is the exponent to which  $b$  must be raised to produce  $x$ .

$$y = \log_b x \leftrightarrow x = b^y$$

## Exponentiation

$$\log_b(b^x) = b^{\log_b(x)} = x$$

## Zero/one

$$\log_b(1) = 0$$

## Multiplication

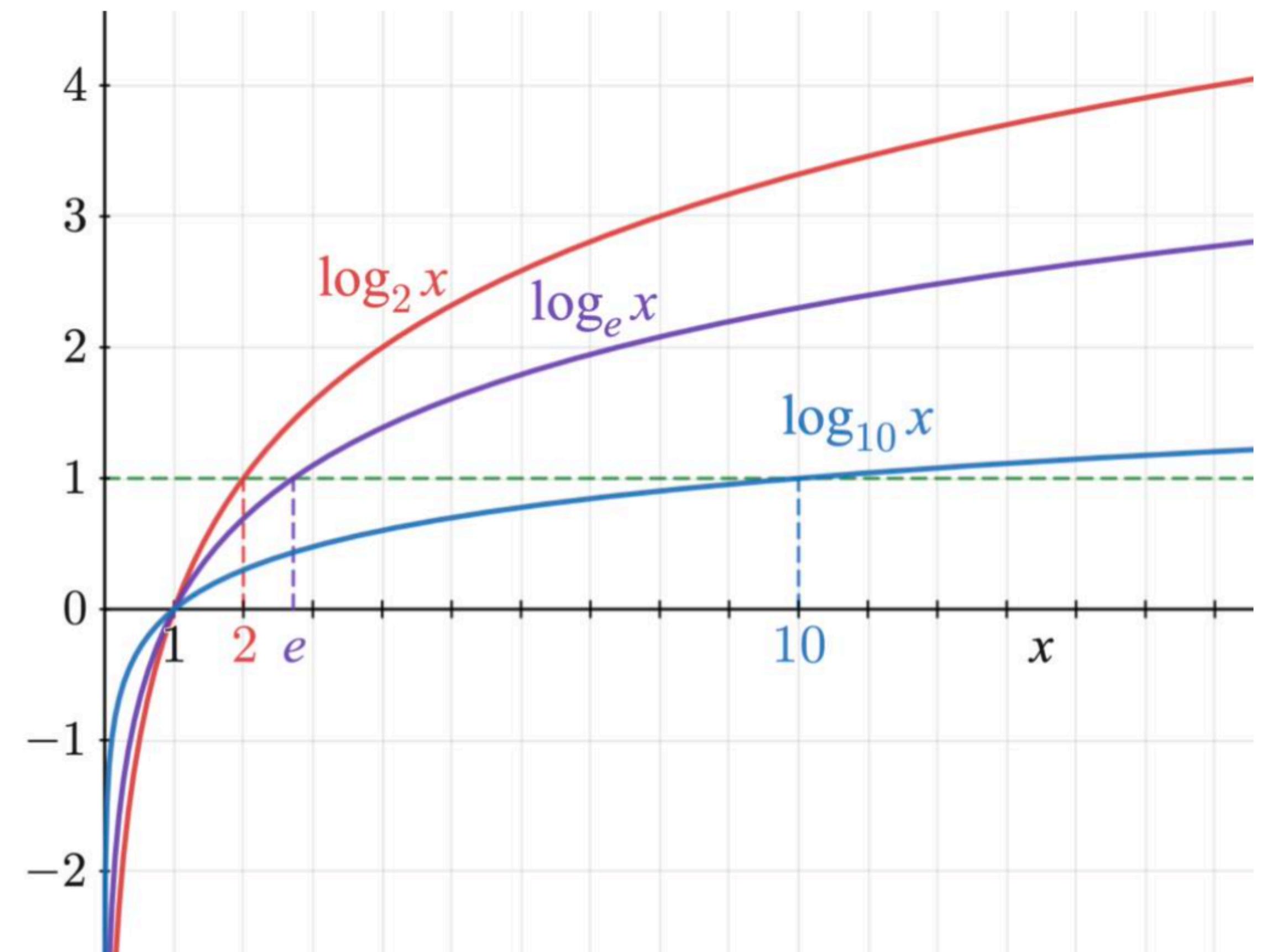
$$\log(x * y) = \log(x) + \log(y)$$

## Changing base

$$\log_a x = \frac{\log_b x}{\log_b a}$$

## Division

$$\log\left(\frac{x}{y}\right) = \log(x) - \log(y)$$



# MORE RULES

## Exponent Rules/Laws



Product Rule	$a^m \times a^n = a^{m+n}$
Quotient Rule	$a^m \div a^n = a^{m-n}$
Power of a Power Rule	$(a^m)^n = a^{mn}$
Power of a Product Rule	$(ab)^m = a^m b^m$
Power of a Quotient Rule	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$
Zero Exponent Rule	$a^0 = 1$
Negative Exponent Rule	$a^{-m} = \frac{1}{a^m}$
Fractional Exponent Rule	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$

## Rule of Logarithms



Rule Name	Property
Log of 1	$\log_b 1 = 0$
Log of the same number as base	$\log_b b = 1$
Product Rule	$\log_b(mn) = \log_b m + \log_b n$
Quotient Rule	$\log_b\left(\frac{m}{n}\right) = \log_b m - \log_b n$
Power Rule	$\log_b m^n = n \log_b m$
Change of Base Rule	$\log_a b = \frac{\log_c b}{\log_c a}$ (OR) $\log_a b \cdot \log_c a = \log_c b$
Equality Rule	$\log_b a = \log_b c \Rightarrow a = c$
Number Raised to Log	$b^{\log_b x} = x$
Other Rules	$\log_b a^m = \frac{m}{n} \log_b a$ $-\log_b a = \log_b \frac{1}{a}$ (OR) $= \log_{\frac{1}{b}} a$

<https://www.cuemath.com/algebra/exponent-rules/>

<https://www.cuemath.com/algebra/log-rules/>

# EXERCISES

In the GILL book (in this order):

- 1.1
- 1.2
- 1.3
- 1.15
- 1.4
- The ones from the lecture's last slide, if you haven't done them

If you need extra stuff, there's optional stuff in the bottom of the markdown

Public Playlist  
**methods 2222222**  
what will the vibes be??  
Pernille Brams and 8 others • 8 likes • 33 songs, 1 hr 55 min

#	Title	Album	Added by	Length
1	The Spins E Mac Miller, Empire ...	K.I.D.S. (Deluxe)	Pernille Bra...	3:16
2	Himmeldiskoteket Isas Stepz	Isas Stepz (Musikken ...)	Pernille Bra...	3:37
3	Sinner	Prelude to Ecstasy	forao.reka2...	2:56

Collab: <https://open.spotify.com/playlist/5UUiKD15vyFwymQ4qLur9V?si=cf80f6c72721427c&pt=a27065eeba53e23fe2dd160612aa5598>