Mathematical communication and representation in a virtual learning environment. A case study

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A word of warning

The environment

UOC

- Virtual learning environment
(self-developed, aging, general purpose)
- “Long life learning”-like environment
(not the standard first year Eng students)
- Editorial process
(again, general purpose)

Digitalization process

- From an “old textbook” model
- …towards digital, more powerful “books”, in XHTML+MathML
- …allowing for a better learning experience

A non-trivial process

- The standards are there, but they have not been widely adopted by browsers
- Authors and editors are not always technically proficient
- Authoring tools are improving, but…

Authoring

de las funciones seno y coseno se hará, en este caso, a partir de las fórmules de Euler:

$$e^{ix} = \cos x + i \sin x$$
$$e^{-ix} = \cos x - i \sin x$$

con x real.

1. Sumando las dos expresiones anteriores obtenemos:
   $$e^{ix} + e^{-ix} = \cos x + i \sin x + \cos x - i \sin x = 2\cos x$$
   De aquí tenemos $\cos x = \frac{e^{ix}+e^{-ix}}{2}$.
2. De la misma manera, pero restando las expresiones anteriores, obtenemos: $e^{ix} - e^{-ix} = 2i \sin x$
   De aquí tenemos $\sin x = \frac{e^{ix}-e^{-ix}}{2i}$

Estas dos expresiones simbólicas que hemos visto para las funciones reales $\cos x$ y $\sin x$ sí que se pueden generalizar a los complejos (ya que precisamente utilizan funciones complejas en la definición).

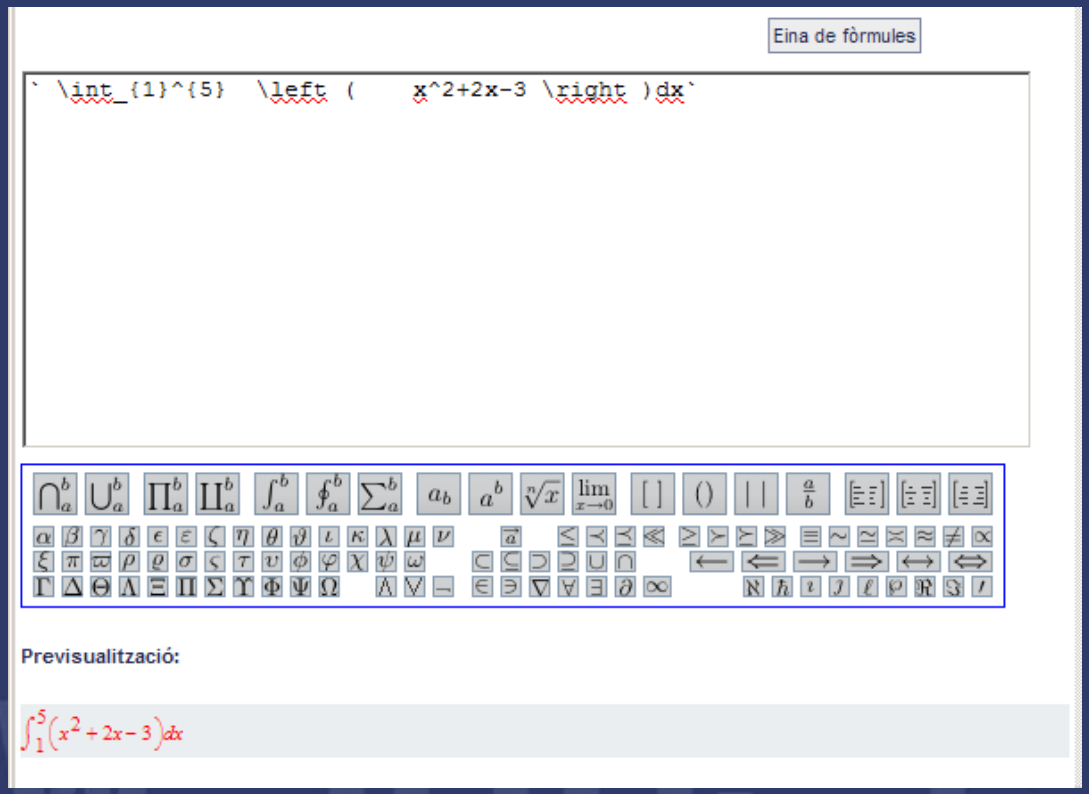
Para $z \in C$ definimos las funciones trigonométricas complejas siguientes:

$$\cos z = \frac{e^{iz} + e^{-iz}}{2}$$
$$\sin z = \frac{e^{iz} - e^{-iz}}{2i}$$
$$\tan z = \frac{\sin z}{\cos z}$$

FF + fonts, IE + plug-in…

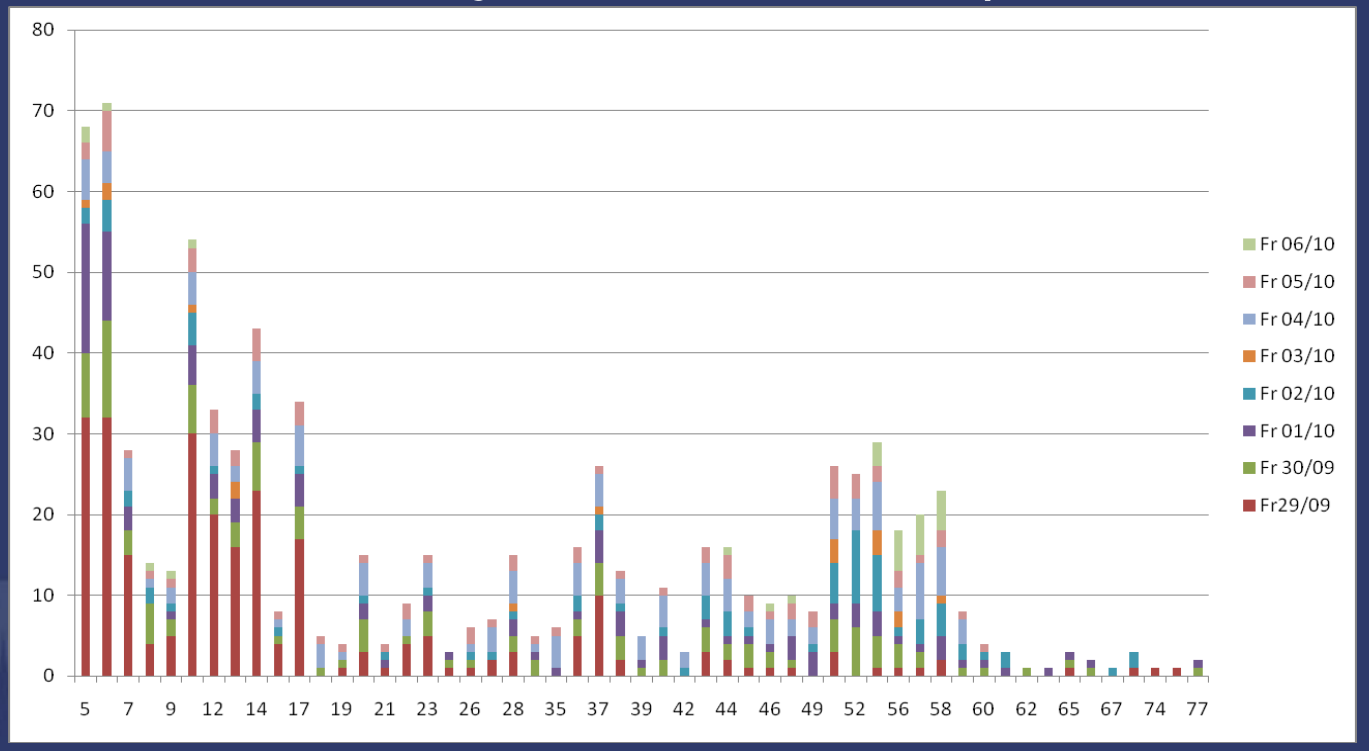
Writing

The e-mail problem…



Reading

The accessibility problem
(and it's not only for the blind)



Reading

Two approaches:

- Human generated (quick and dirty, better, non-scalable)
- Computer generated (faster, error prone)

Where we are now

- We have some digital content. And it does work better:
  - Online CAS use
  - Verbalization tools
  - Multimedia resources
- Steps have been taken so we can profit from initiatives such as NIST's Digital Library

The future

- Technology has been improving (MathJax, HTML5)
- The editorial process has been improving

- Better information, better tools

Merci beaucoup!

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