

CS 103000

Prof. Madeline Blount

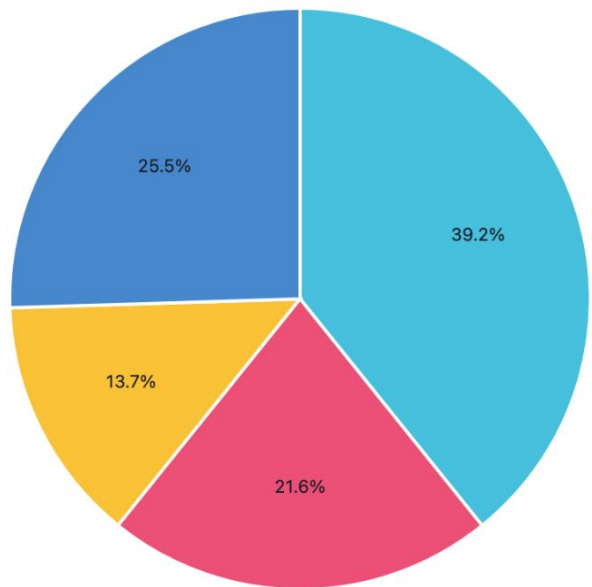
Week 2: VARIABLES

ATTENDANCE:

<https://cs103-proton.glitch.me/>

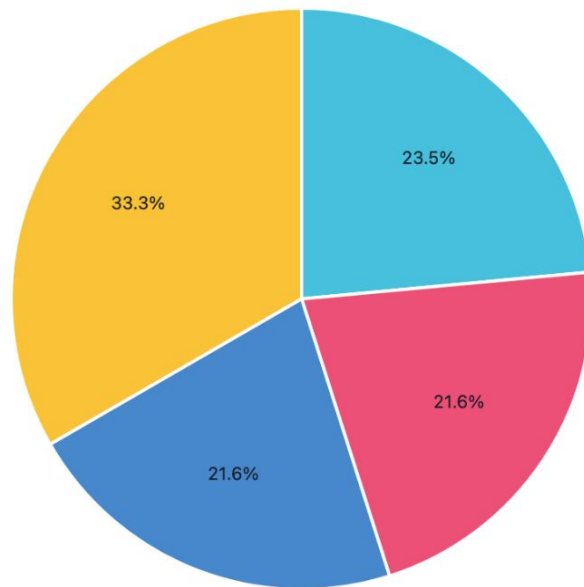


*Dall-E 2: cats learning C++ in the forest on '90's technology*



09.11 emoji

- 🦋 (20)
- 🦋 (7)
- 🦋 (11)
- 🦋 (13)



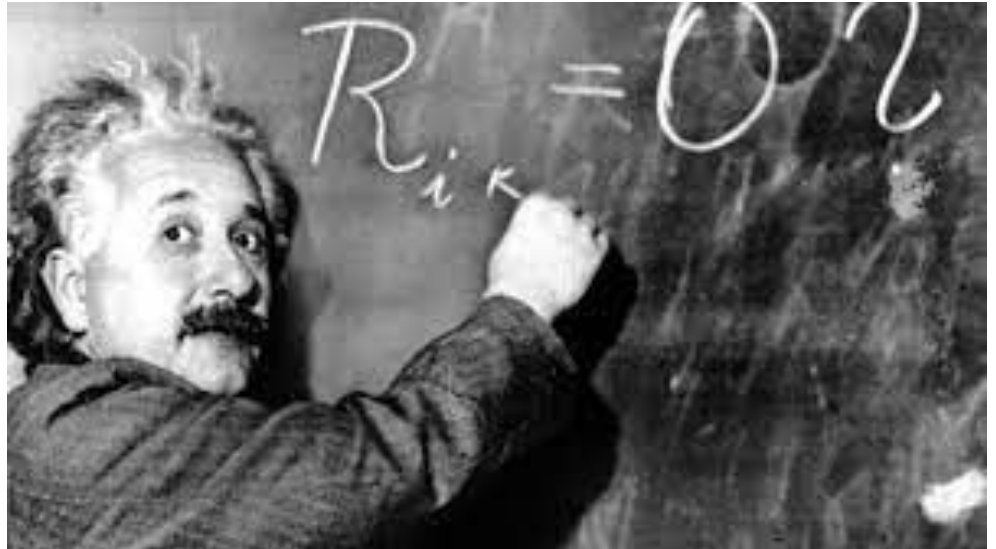
09.06 emoji

- 😎 (12)
- 🔥 (17)
- 🍷 (11)
- 🍔 (11)

## mass-energy equivalence

How much energy is locked up in a mass  
of given kg?

$$E = mc^2$$



FROM  
 Prof. Albert Einstein.  
 Talk on Relativity at C.C.N.Y.

$$\underline{x'_v(x_v)}$$

$$\underline{\oint ds} = 0$$

$$\underline{ds^2 = \sum dx_v^2}$$

$$\sum \left( \frac{\partial x_v}{\partial x'_\mu} a'_\mu \right)^2$$

$$\underline{\sum g'_{\mu\nu} dx'_\mu dx'_\nu}$$

April 7<sup>th</sup> 1921.







Long Island, 1939



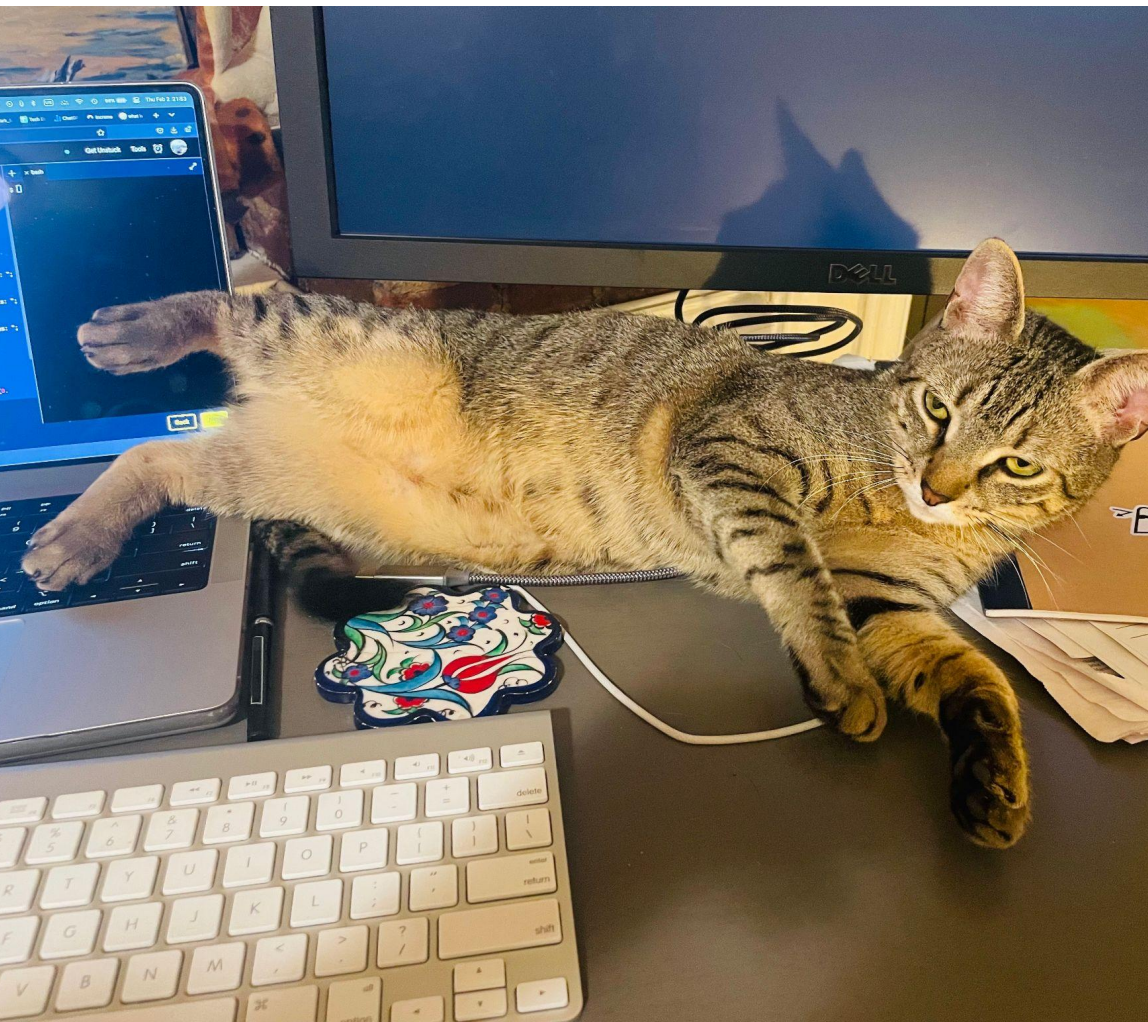
*Einstein on the Beach*, BAM 2012

[https://www.nytimes.com/2012/09/17/arts/music/einstein-on-the-beach-at-the-brooklyn-academy-of-music.ht](https://www.nytimes.com/2012/09/17/arts/music/einstein-on-the-beach-at-the-brooklyn-academy-of-music.html)

$c = 2.99792458 \times 10^8 \text{ m/s};$

$\text{proton} = 1.67262192 \times 10^{-27} \text{ kilograms}$









## INTEGER OVERFLOW: weirdness, limitations



we don't have infinite memory!

int = 32 bits (4 bytes)

000000000000000000000000000000000000

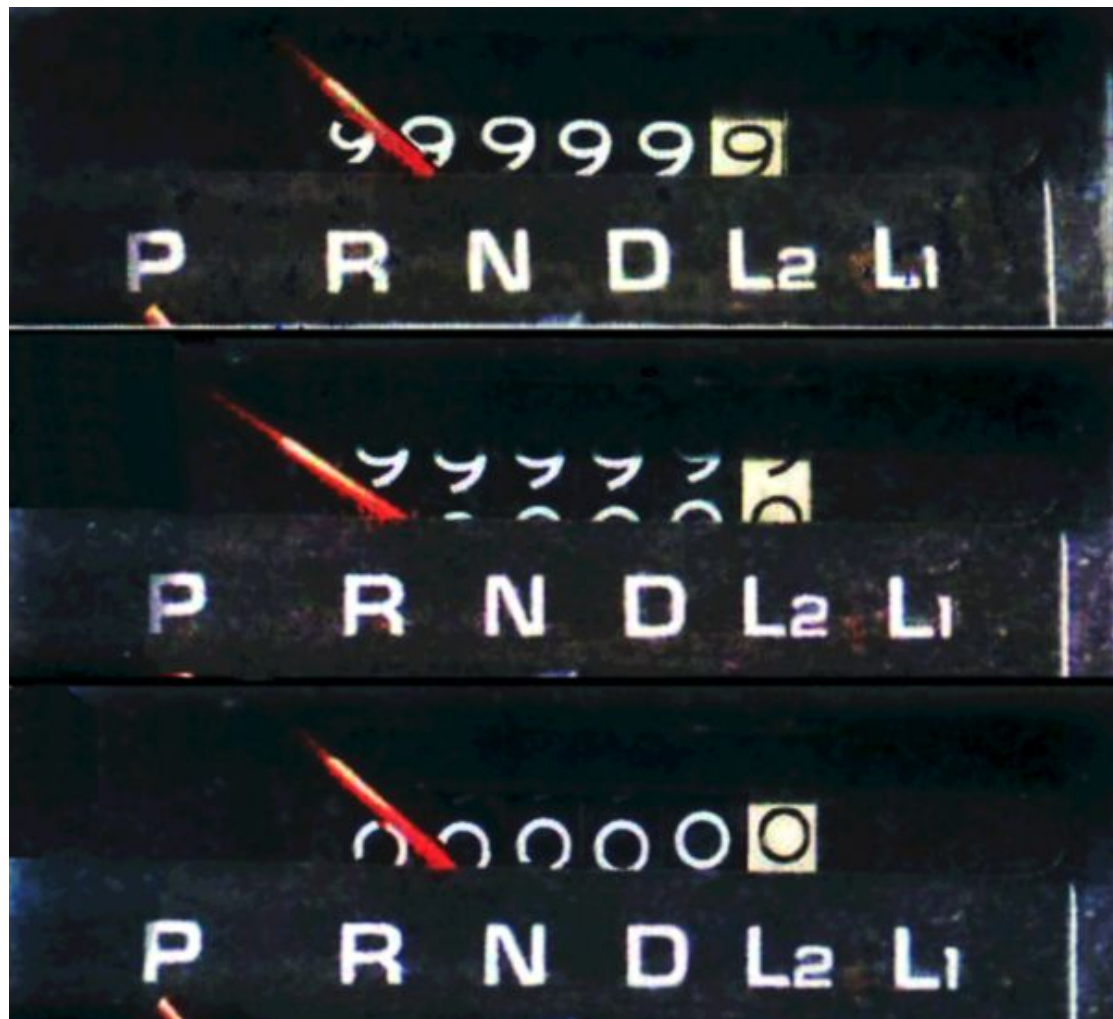
111111111111111111111111111111111111

4,294,967,295

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+/- 2,147,483,647

## INTEGER OVERFLOW





<https://www.youtube.com/shorts/gzf8hS69KAs>



INTEGER OVERFLOW

RUNNING OUT OF  
TIME!

Jan. 19th, 2038

32-bit integer  
seconds ++ after  
Jan. 1, 1970  
(UNIX TIME)



Data Type	Memory Size
bool	1 byte
char	1 byte
int	4 bytes
float	4 bytes
double	8 bytes
std::string	24 bytes



```
static_cast<type>(variable)
```