# B.H. Brown's amazing theorem

**Question**: Pick a random day from a random year. If it turns out to be the 13th of some month, what day of the week is it most likely to be?

**Answer**: A Friday!

**Source**: B.H. Brown, American Mathematical Monthly Volume 40, Number 10 (1933), page 607

# Why?

Our calendar, the Gregorian, works on a cycle of 400 years

- Every 4th year is a leap year
- Only one of every four century years are leap years
  - 1600, 2000, 2400, ... - YES
  - 1700, 1800, 1900, 2100, 2200, 2300, ... - NO
- 400 years is exactly 20,871 weeks
- November 4 2011 is same day of week as November 4 2411, and November 13 2811, ...

# A brute-force calculation

There are 4800 13th-of-the-months in any span of 400 years:

- **Monday**: 685
- **Tuesday**: 685
- **Wednesday**: 687
- **Thursday**: 684
- **Friday**: **688**
- **Saturday**: 684
- **Sunday**: 687

So 13th is (slightly) more likely to be Friday than any other day!