Ephemera

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Principles of Complex Systems, Vols. 1, 2, & 3D
CSYS/MATH 6701, 6713, & a pretend number,
2023–2024 | @pocsvox

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Season 15 of
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Various things
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Outline

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From YojimboJango, Tuesday January 29, 2013 @09:12AM (#42725321), Slashdot

"I wrote this a while ago, but I find it's useful to post it here:

- The precondition that you can write terrible code in any language is a mental diversion. You must design languages for people that believe in intelligent design.
- If there is low hanging fruit in your garden of eden, people are going to assume that someone vastly smarter then they are placed it there for plucking.
- Not even God himself coming down from on high and face to face telling every member of the human race not to touch it is going to keep it from being abused.
- That is the true nature of humanity and by inclusion programmers."

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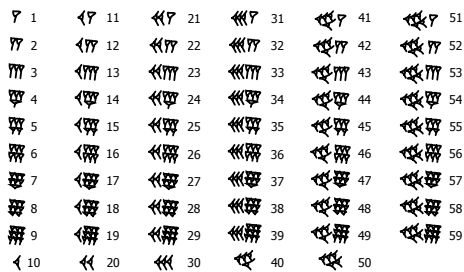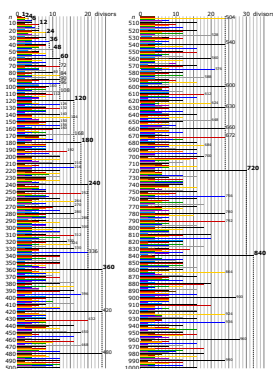PoCS, Vol. 1
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YojimboJango's taxonomy (1/2):

- **perl:** An unorganized, but sprawling garden full of almost every imaginable fruit. Regex is a shiny sinful apple at eye level on every single tree. The only way to navigate the garden is to ask the snakes.
- **python:** An organized garden that has one of each kind of fruit. But it's half way through being dug up and replanted into an even more organized garden.
- **ruby:** A newer garden. Heaps of fertilizer make everything grow incredibly fast, but the trees are getting tangled and there's a problem with weeds.
- **C#:** Someone spent a lot of money crafting this garden correctly. They also planted trees that emit a hypnotic pollen that will murder you if you try to leave the garden.

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YojimboJango's taxonomy (2/2):

- **java:** A beautiful garden but only when viewed from space. Every tree has exactly 1 fruit, and getting anywhere takes forever. Recently taken over by someone interested in C#'s hypnotic pollen trees.
- **C++:** An industrial farm complete with tractors and combine harvesters, but no safety equipment. As a bonus 98% of the farm does not contain buried land mines.
- **C:** A plot of land and a barn full of seeds. Get to work.
- **javascript:** There's only 1 tree and it grows upside down, but you can find it resurfacing in all the other gardens. It's also sentient, growing rapidly, and trying to murder you.

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A few fictional characters most like Pratchett the Cat:

1. Elizabeth Swann (Pirates of the Caribbean): 83%
2. Daenerys Targaryen (Game of Thrones): 82%
3. Margaery Tyrell (Game of Thrones): 82%
4. Francisco d'Anconia (Atlas Shrugged): 82%
5. Dr. Hannibal Lecter (Hannibal): 82%
6. Audrey Horne (Twin Peaks): 81%
7. Princess Anna Karenina (Anna Karenina): 81%
8. Danny Ocean (Ocean's 11): 81%
9. Ragnar Lothbrok (Vikings): 81%
10. Olenna Tyrell (Game of Thrones): 80%

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Some fictional characters most like the Deliverator:

1. Ava (Ex Machina): 89%
2. Dolores Abernathy (Westworld): 87%
3. Dom Cobb (Inception): 86%
4. Maeve Millay (Westworld): 84%
5. Patrick Jane (The Mentalist): 84%
6. Wyldstyle (The Lego Movie): 84%
7. Daisy 'Skye' Johnson (Agents of S.H.I.E.L.D.): 84%
8. Black Widow (Marvel Cinematic Universe): 83%
9. Elizabeth Swann (Pirates of the Caribbean): 83%
10. Jason Bourne (The Bourne Identity): 83%
11. Mystique (X-Men): 83%
12. Juliana Crain (The Man in the High Castle): 83%
13. Arya Stark (Game of Thrones): 82%
14. Gamora (Marvel Cinematic Universe): 82%
15. Sherlock Holmes (Elementary): 82%

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Once was DodecaPoCS

Twelve is a hero:

- 12 is a superior highly composite number, highly totient, and super abundant.
- 12 is one of only two known sublime numbers, for which both the number and sum of their positive factors are perfect numbers (6 and 28).
- Compositeness means the Duoedecimal System is for Winners: 12 hours in half a day, 12 inches in a foot.[1]
- 'Twelve', 'twelfth', and 'twelvish' all have excellent speekfeel.
- And 'dozen'. 'Dozen', 'dozen', 'dozen'.
- Related: The Rampaging On-Line Encyclopedia of Integer Sequences, https://oeis.org.

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[1] Metric-Schmetric

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Universal numbers

From here.

- Accidents of evolution[1] give us 5 + 5 = 10 fingers and hence base 10.
- We could be happy with base 6, 8, 12, …
- We like these:
  - 60 seconds in a minute
  - 60 minutes in an hour.
  - $2 \times 12 = 24$ hours in a day.
  - 360 degrees in a circle.

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[1] Maybe 5 fingers are not an accident.

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We've liked these kinds of numbers for a long time: ⎘

𒁹 1	𒌋𒁹 11	𒌋𒌋𒁹 21	𒌍𒁹 31	𒐏𒁹 41	𒐐𒁹 51
𒁹𒁹 2	𒌋𒁹𒁹 12	𒌋𒌋𒁹𒁹 22	𒌍𒁹𒁹 32	𒐏𒁹𒁹 42	𒐐𒁹𒁹 52
𒁹𒁹𒁹 3	... 13	... 23	... 33	... 43	... 53
4	14	24	34	44	54
5	15	25	35	45	55
6	16	26	36	46	56
7	17	27	37	47	57
8	18	28	38	48	58
9	19	29	39	49	59
𒌋 10	𒌋𒌋 20	𒌍 30	𒐏 40	𒐐 50	

- 2000 BC: Babylonian base 60/Sexagesimal system.
- Other bases ⎘ (or radices): 2, 10, 12 (duodecimal/dozenal ⎘), 6 (senary), 8, 16, 20 (vigesimal), 60.

Highly composite numbers: ⎘

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- HCN = natural number with more divisors than any smaller natural number.
- 2, 4, 6, 12, 24, 36, 48, 60, 120, 180, 240, 360, 720, 840, 1260, 1680, 2520, 5040 (Plato's optimal city population ⎘), ...
- OEIS sequence A002182 ⎘

By Cmglee - Own work, CC BY-SA 3.0,
https://commons.wikimedia.org/w/index.php?curid=31684018 ⎘

Superior highly composite numbers: ⎘

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# prime factors	SHCN n	prime factorization	prime exponents	# divisors $d(n)$	primorial factorization
1	2	2	1	2	2
2	6	$2 \cdot 3$	1,1	4	6
3	12	$2^2 \cdot 3$	2,1	6	$2 \cdot 6$
4	60	$2^2 \cdot 3 \cdot 5$	2,1,1	12	$2 \cdot 30$
5	120	$2^3 \cdot 3 \cdot 5$	3,1,1	16	$2^2 \cdot 30$
6	360	$2^3 \cdot 3^2 \cdot 5$	3,2,1	24	$2 \cdot 6 \cdot 30$
7	2520	$2^3 \cdot 3^2 \cdot 5 \cdot 7$	3,2,1,1	48	$2 \cdot 6 \cdot 210$
8	5040	$2^4 \cdot 3^2 \cdot 5 \cdot 7$	4,2,1,1	60	$2^2 \cdot 6 \cdot 210$
9	55440	$2^4 \cdot 3^2 \cdot 5 \cdot 7 \cdot 11$	4,2,1,1,1	120	$2^2 \cdot 6 \cdot 2310$
10	720720	$2^4 \cdot 3^2 \cdot 5 \cdot 7 \cdot 11 \cdot 13$	4,2,1,1,1,1	240	$2^2 \cdot 6 \cdot 30030$

- SHCN = natural number n whose number of divisors exceeds that of any other number when scaled relative to itself in a sneaky way:

$$\frac{d(n)}{n^\epsilon} \geq \frac{d(j)}{j^\epsilon} \text{ and } \frac{d(n)}{n^\epsilon} > \frac{d(k)}{k^\epsilon}$$

for $j < n < k$ and some $\epsilon > 0$.

There's more: Superabundant numbers ⎘

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- n is superabundant if:

$$\frac{\sigma_1(n)}{n} > \frac{\sigma_1(j)}{j}$$

for $j < n$ and where $\sigma_x(n) = \sum_{d|n} d^x$ is the divisor function.

- 449 numbers are both superabundant and highly composite.

Yet more: Colossally abundant numbers: ⎘

- n is colossally abundant if for all j and some $\epsilon > 0$:

$$\frac{\sigma_1(n)}{n^{1+\epsilon}} \geq \frac{\sigma_1(j)}{j^{1+\epsilon}}$$
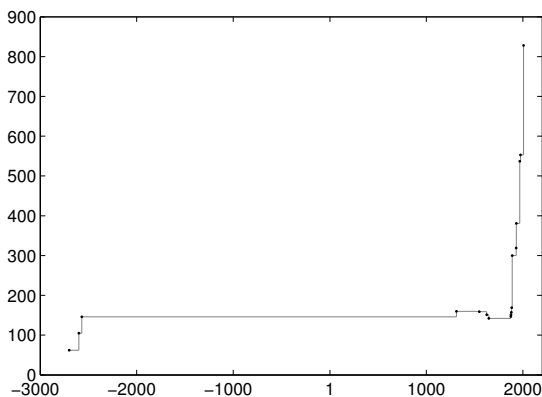
- Infinitely many but only 22 less than 10^{18}.

Some very, very silly units of measurement courtesy of the Imperial system ⎘:

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- 22 yards in a chain = 1 cricket pitch, 100 links in a chain, 10 chains in a furlong, 80 chains in a mile.
- 1 acre = 1 furlong × 1 chain = 43,560 square feet.
- 160 fluid ounces in a gallon.
- 14 pounds in a stone.
- Hundredweight = 112 pounds.

Also:

- Fahrenheit, Celcius, and Kelvin.
- The entire metric system.

What's this?

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The walkie-talkie dialect:[2]

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- Stamps: Lickie Stickie
- Defibrillators: Heartie Startie
- Bumble bees: Fuzzie Buzzie
- Pregnancy test: Maybe Baby
- Fork: Stabbie Grabbie
- Socks: Feetie Heatie
- Hippo: Floatie Bloatie
- Nightmare: Screamie Dreamie

[2]From the inciting tweet of excellence:
https://twitter.com/Flaminhaystack/status/977899605349339137

More:

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- Ambulance: Sendie Mendie
- Miniature sausage dog: Teenie Weenie
- Shot glass: Dinkie Drinkie
- Lifejacket: Boatie Coatie
- Low fat desserts: Fakey Cakey
- Cat: Furrie Purrie

A small task—Order the following adjectives to describe a knife (alphabetically ordered):

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- little
- lovely
- old
- orange
- rectangular
- steel
- whittling
- Victorian

As in "something-something-...-something knife."

How does these feel?

- "orange lovely knife",
- "rectangular old knife",
- "Victorian little knife",
- "whittling little knife".
- "A whittling, steel, Victorian, orange, rectangular, old, little, lovely, knife."

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The exception to the rule proves the rule:[4]

Vowel sequencing overrules adjective ordering:

- Order: opinion - size - age - shape - color - origin - material - purpose.
- Little Red Riding Hood (okay: size - color - purpose).
- Big Bad Wolf (vowel ordering wins: size - opinion).
- Lon-lat is horizontal-vertical (x-y) but doesn't sound good.
- Lat-Lon sounds good but is vertical-horizontal (y-x). Yikes.
- (Separately: x-y is sensibly alphabetic, but we have made an abstraction concrete.)
- Trouble-at-mill: Twitter has in the past had lon-lat and lat-lon in a single tweet's json.

[3] https://en.wikipedia.org/wiki/Coodabeen_Champions

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Outline:

- Determine "anchor day" for a given century, then find Doomsday for a given year in that century.
- Remember special Doomsday dates and work from there.
- Naturally: Load this year's Doomsday into brain.

Century's anchor day (Gregorian, Sunday $\equiv 0$):

$$5 \times \left(\left\lfloor \frac{YYYY}{100} \right\rfloor \bmod 4 \right) \bmod 7 + \text{Tuesday}$$

Offset:

$$\left(365 YY + \left\lfloor \frac{YY}{4} \right\rfloor \right) \bmod 7 = \left(YY + \left\lfloor \frac{YY}{4} \right\rfloor \right) \bmod 7$$

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Adjective order in English: [3]

"Adjectives in English absolutely have to be in this order: opinion - size - age - shape - colour - origin - material - purpose.

So you can have a lovely, little, old, rectangular, green, Victorian, steel, whittling knife.

But if you mess with that word order in the slightest you'll sound like a maniac.

It's an odd thing that every English speaker uses that list, but almost none of us could write it out."

[3] http://www.bbc.com/culture/story/20160908-the-language-rules-we-know-but-dont-know-we-know

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Europe:

- Many errors called out in comments. Why hasn't this been done well?

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Doomsdays for the Gregorian calendar

- Works for Gregorian (1582–, haphazardly) and the increasingly inaccurate Julian calendars (400 and 28 years cycles).
- Apparently inspired by Lewis Carroll's work on a perpetual calendar.

Vowel space fun times (ablaut reduplication):

- Tick-tock not tock-tick.
- Hip-hop not hop-hip.
- Bing-bong not bong-bing.
- Ping-pong not pong-ping.
- Flip-flop not flop-flip.
- Clip-clop not clop-clip (Onomatopoeia)
- Dilly-dally not dally-dilly.
- Pitter-patter not patter-pitter.
- Pitapat not patapit.
- Zig-zag not zag-zig.
- Om not Mo (A-U-M, back to front of the mouth).

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John Conway's Doomsday rule [↗] for determining a date's day of the week:

Memorable Doomsdays:

Month	Memorable date	Month/Day	Mnemonic[6]
January	January 3 (common years), January 4 (leap years)	1/3 or 1/4	the 3rd **3** years in 4 and the 4th in the 4th
February	February 28 (common years), February 29 (leap years)	2/28 or 2/29	last day of February
March	"March 0"	3/0	last day of February
April	April 4	4/4	**4/4**, 6/6, 8/8, 10/10, 12/12
May	May 9	5/9	**9-to-5** at 7-11
June	June 6	6/6	4/4, **6/6**, 8/8, 10/10, 12/12
July	July 11	7/11	9-to-5 at **7-11**
August	August 8	8/8	4/4, 6/6, **8/8**, 10/10, 12/12
September	September 5	9/5	**9-to-5** at 7-11
October	October 10	10/10	4/4, 6/6, 8/8, **10/10**, 12/12
November	November 7	11/7	9-to-5 at **7-11**
December	December 12	12/12	4/4, 6/6, 8/8, 10/10, **12/12**

- Pi day (March 14), July 4, Halloween, and Boxing Day are always Doomsdays.

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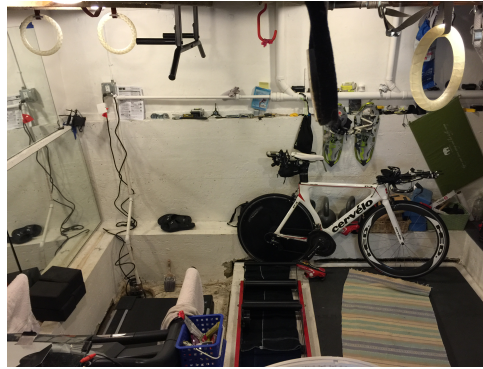Various things
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The bissextile year [↗]

"The Julian calendar, which was developed in 46 BC by Julius Caesar, and became effective in 45 BC, distributed an extra ten days among the months of the Roman Republican calendar. Caesar also replaced the intercalary month by a single intercalary day, located where the intercalary month used to be. To create the intercalary day, the existing ante diem sextum Kalendas Martias (February 24) was doubled, producing ante diem bis sextum Kalendas Martias. Hence, the year containing the doubled day was a bissextile (bis sextum, "twice sixth") year. For legal purposes, the two days of the bis sextum were considered to be a single day, with the second half being intercalated; but in common practice by 238, when Censorinus wrote, the intercalary day was followed by the last five days of February, a. d. VI, V, IV, III and pridie Kal. Mart. (the days numbered 24, 25, 26, 27, and 28 from the beginning of February in a common year), so that the intercalated day was the first half of the doubled day. Thus the intercalated day was effectively inserted between the 23rd and 24th days of February."

Homo nonprobabilisticus, continued:

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- Important detour: The final digits of primes are not entirely random ⟲ (how did we not know this?).

- Start flipping a coin ...

- Two tosses: What are the probabilities of flipping (1) HH and (2) HT?

- Flip a coin $n \geq 2$ times: What are the probabilities that the last two tosses are (1) HH or (2) HT?

- Estimate: On average, how many flips does it take to first see the sequence HT?

- Estimate: On average, how many flips does it take to first see the sequence HH?

- What's the probability of first flipping a HT sequence on the $n-1$th and nth flips?

- What's the probability of first flipping two heads in a row (HH) on the $(n-1)$th and nth flips?

Homo nonprobabilisticus, continued:

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Average number of flips: 4 and 6.

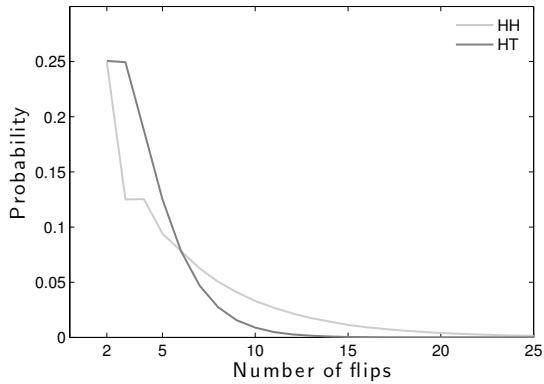## Burning through stories for fuel in the Experimental Training Laboratory:

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