Hello, World!

What is computer science?

- Math
- Logic
- Engineering
- Philosophy

What are computers?

LOGARITHMS, BASE 10 $\log_{10} x$ or $\lg x$

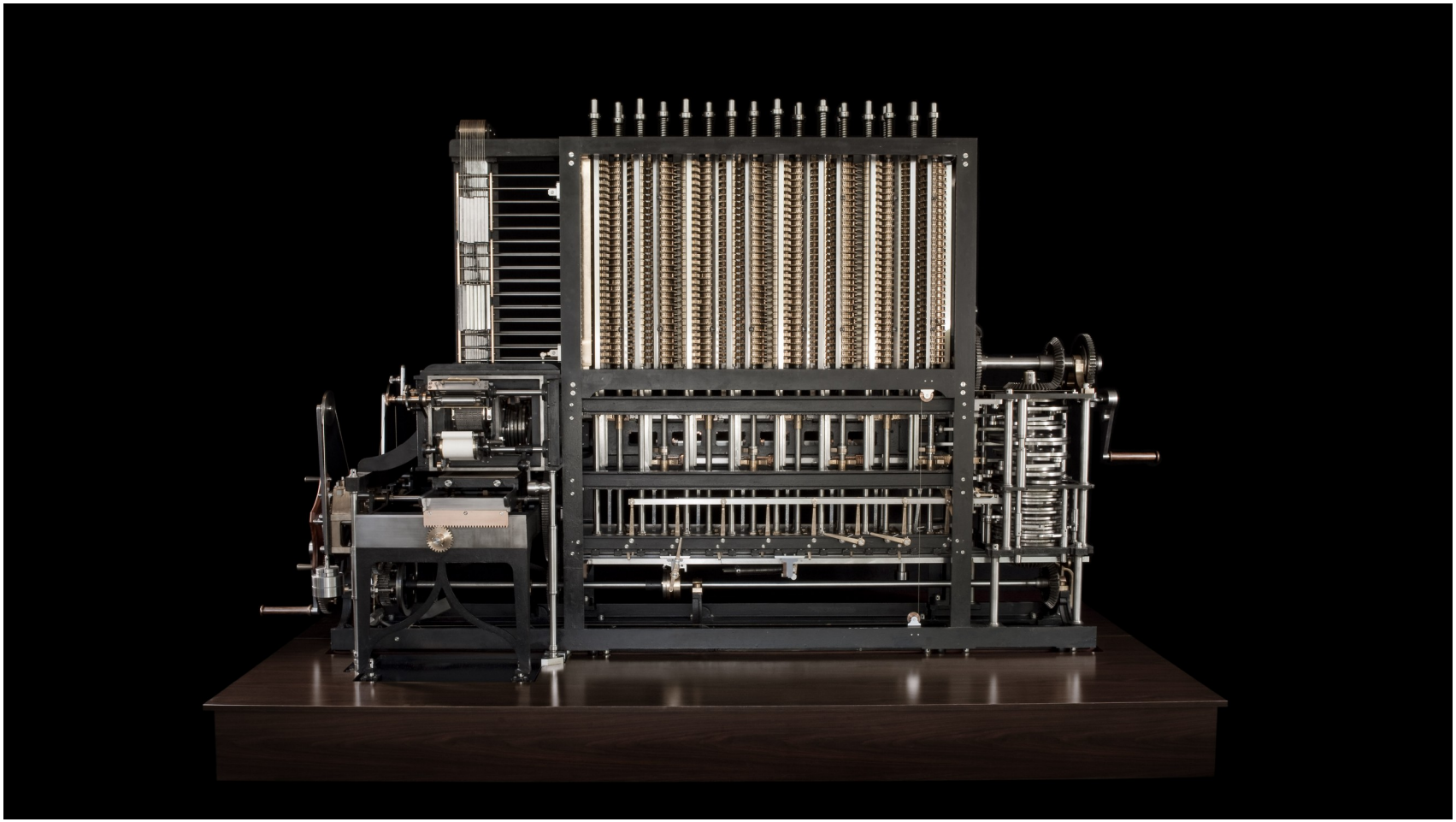
x	0	1	2	3	4	5	6	7	8	9	ADD 1 2 3	ADD 4 5 6	ADD 7 8 9
10	.0000	0043	0086	0128	0170						4 8 13	17 21 25	29 34 38
						0212	0253	0294	0334	0374	4 8 12	16 20 24	28 32 36
11	.0414	0453	0492	0531	0569						4 8 12	16 19 23	27 31 35
						0607	0645	0682	0719	0755	4 7 11	15 19 22	26 30 33
12	.0792	0828	0864	0899	0934						4 7 11	14 18 21	25 28 32
						0969	1004	1038	1072	1106	3 7 10	14 17 20	24 27 31
13	.1139	1173	1206	1239	1271						3 7 10	13 16 20	23 26 30
						1303	1335	1367	1399	1430	3 6 10	13 16 19	22 26 29
14	.1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3 6 9	12 15 18	21 24 27
15	.1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	3 6 8	11 14 17	20 22 25
16	.2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3 5 8	10 13 16	18 21 23
17	.2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	2 5 7	10 12 15	17 20 22
18	.2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2 5 7	10 12 14	17 19 22
19	.2788	2810	2833	2856	2878	2900	2923	2945	2967	2989	2 4 6	9 11 13	15 18 20
20	.3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2 4 6	8 11 13	15 17 19
21	.3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2 4 6	8 10 12	14 16 18
22	.3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2 4 6	8 10 11	13 15 17
23	.3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2 4 5	7 9 11	13 14 16
24	.3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2 4 5	7 9 11	13 14 16
25	.3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2 3 5	7 9 10	12 14 15
26	.4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2 3 5	6 8 10	11 13 14
27	.4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2 3 5	6 8 10	11 13 14
28	.4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2 3 5	6 8 9	11 12 14
29	.4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1 3 4	6 7 9	10 12 13
30	.4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1 3 4	6 7 8	10 11 13
31	.4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1 3 4	6 7 8	10 11 13
32	.5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1 3 4	5 7 8	9 10 12
33	.5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1 3 4	5 6 8	9 10 12
34	.5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1 3 4	5 6 8	9 10 12
35	.5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1 2 4	5 6 7	8 10 11
36	.5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1 2 4	5 6 7	8 10 11
37	.5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1 2 4	5 6 7	8 10 11
38	.5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1 2 3	4 6 7	8 9 10
39	.5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1 2 3	4 6 7	8 9 10
40	.6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1 2 3	4 5 7	8 9 10
41	.6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1 2 3	4 5 6	7 8 9
42	.6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1 2 3	4 5 6	7 8 9
43	.6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1 2 3	4 5 6	7 8 9
44	.6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1 2 3	4 5 6	7 8 9
45	.6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	1 2 3	4 5 6	7 8 9
46	.6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1 2 3	4 5 5	6 7 8
47	.6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1 2 3	4 5 5	6 7 8
48	.6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1 2 3	4 4 5	6 7 8
49	.6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1 2 3	4 4 5	6 7 8

Examples:

$\lg 3.674 = 0.5647 + 0.0005 = 0.5652$
$\lg 367.4 = \lg (3.674 \times 10^2) = 2.5652$
$\lg 0.003674 = \lg (3.674 \times 10^{-3}) = \bar{3}.5652$

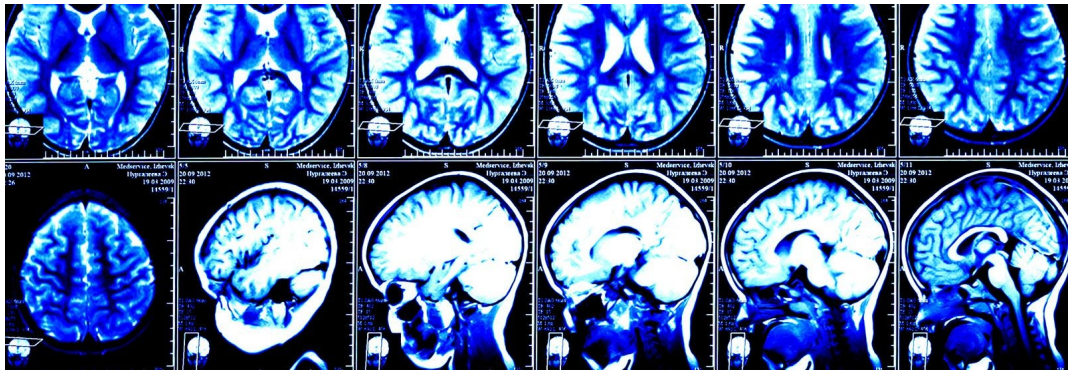
Constant	π	e	$\lg e$	$\ln 10$
Value	3.14159	2.71828	0.43429	2.30259
log (base 10)	0.49715	0.43429	$\bar{1}$.63778	0.36222

What are computers?



What are computers?

What are computers used for?



What do you use computers for?

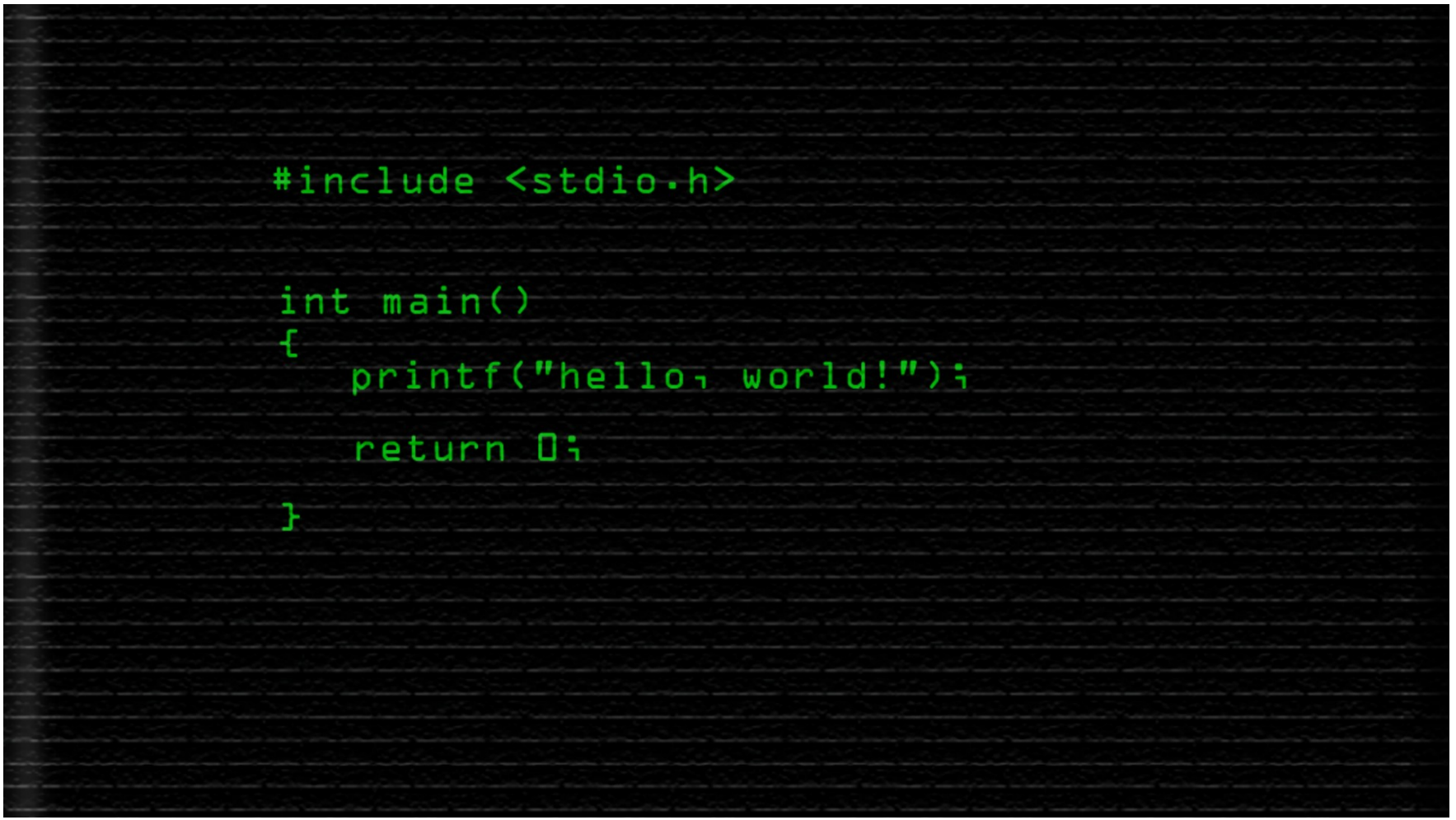
A brief history lesson

Turing Machines

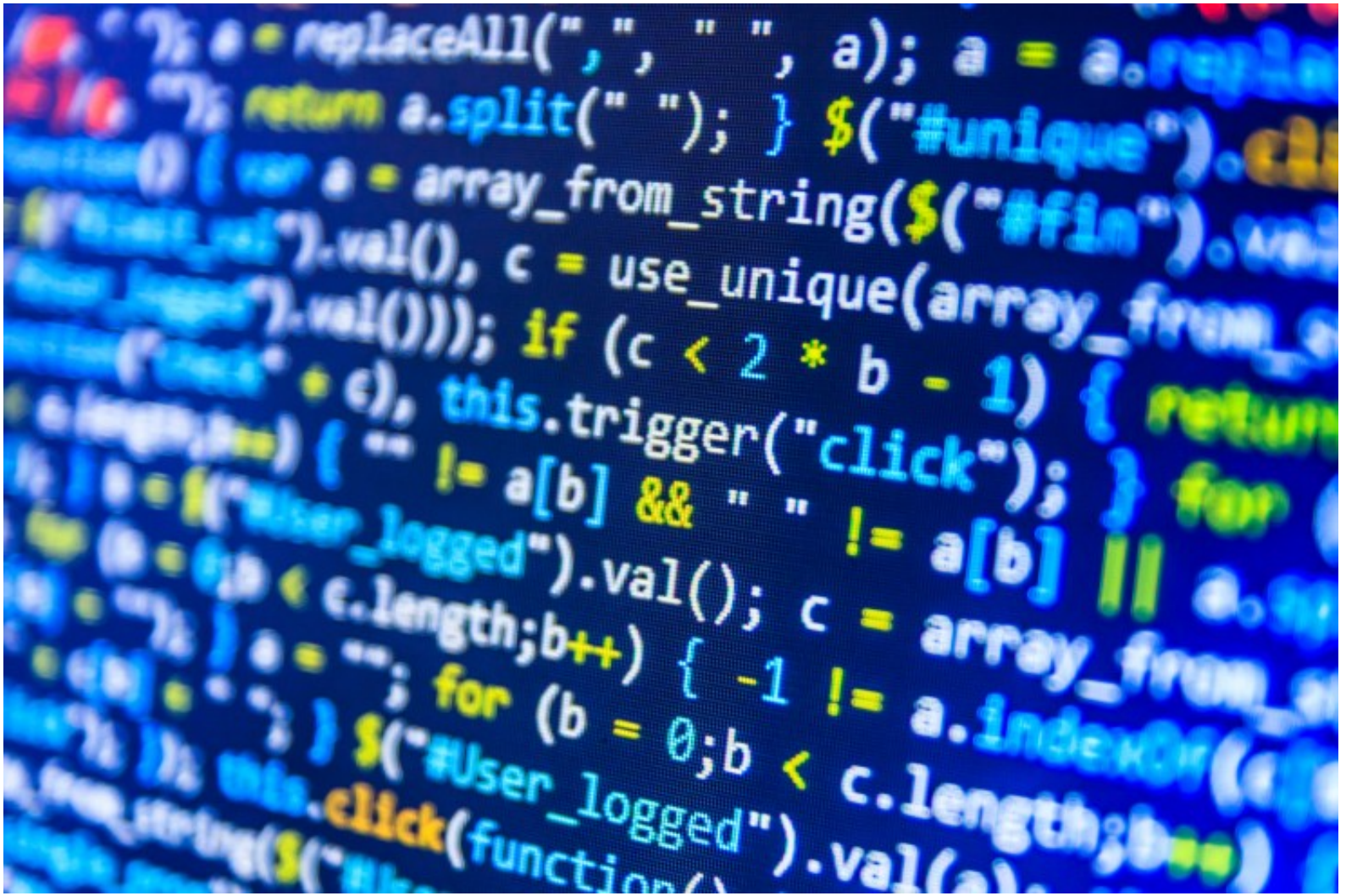
https://www.youtube.com/watch?v=E3keLeMwfHY

How non-programmers interact

How programmers interact

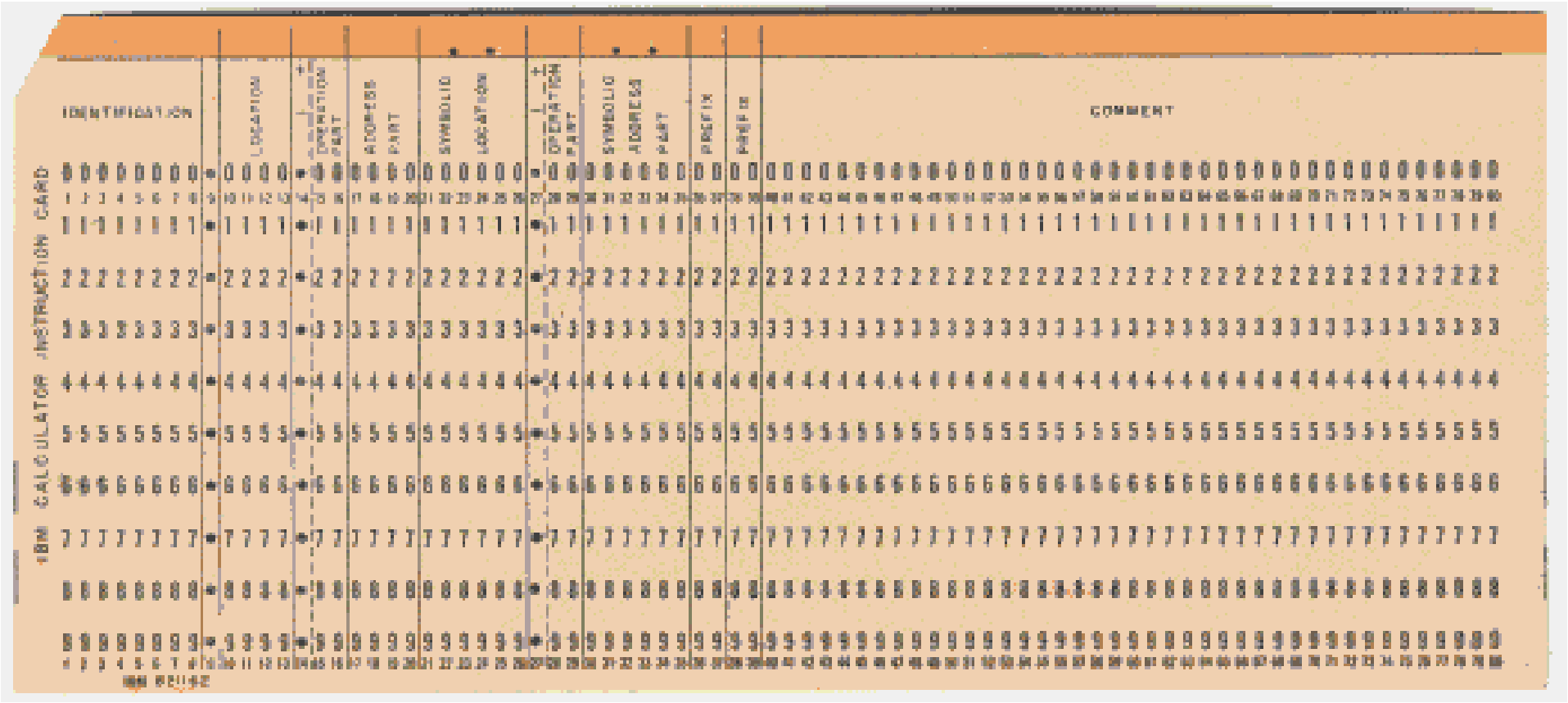


What is code?

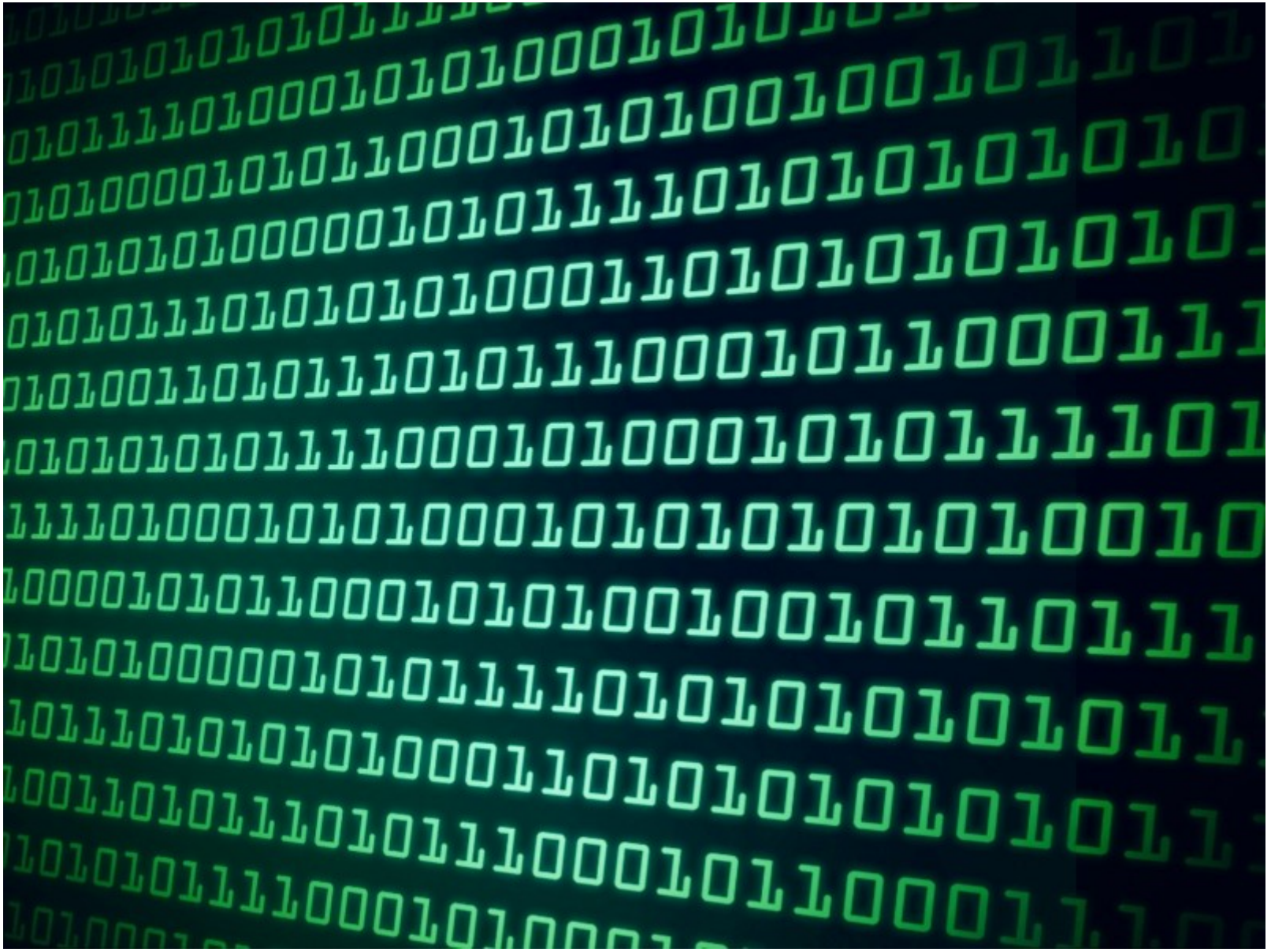

replaceAll(",", " ", a); a =
return a.split(" "); } $("#unique")
array_from_string($("#fin")
).val(), c = use_unique(array_
).val())); if (c < 2 * b - 1)
c), this.trigger("click");
!= a[b] && " " != a[b] ||
logged").val(); c = array
c.length;b++) { -1 != a.
; for (b = 0;b < c.length;
$("#User_logged").val(
.click(function

But wait…..

- Do computers really speak in code?



Binary!



Programs

```
function check(n)
  {   // check if the number n is a prime
    var factor; // if the checked number is not a prime, this is its first factor
    var c;
    factor = 0;
    // try to divide the checked number by all numbers till its square root
    for (c=2 ; (c <= Math.sqrt(n)) ; c++)
       {
        if (n%c == 0)    // is n divisible by c ?
           {factor = c;  break}
       }
    return (factor);
  }   // end of check function

function communicate()
  {  // communicate with the user
    var i;       // i is the checked number
    var factor; // if the checked number is not a prime, this is its first factor
    i = document.primetest.number.value;       // get the checked number
    // is it a valid input?
    if ((isNaN(i)) || (i <= 0) || (Math.floor(i) != i))
      {alert ("The checked object should be a whole positive number")} ;
    else
      {
       factor = check (i);
       if (factor == 0)
          {alert (i + " is a prime")} ;
       else
          {alert (i + " is not a prime, " + i + "=" + factor + "X" + i/factor) }
      }
  }     // end of communicate function
```

Characteristics of Programs

One instruction at a time

Can make decisions

Can reuse code

Can store something for later use

Can utilize an algorithm

What is an Algorithm?

Computers are very explicit

Goals

Pseudocode

Javascript

HTML/CSS

Project

Exercise

Suppose that someone buys an item from you for $x, where x is a value less than 20. They pay for this item with a $20 bill. Explain how you would give them change, being as specific as possible. Make sure you use the smallest number of bills and coins.