Бюджетное учреждение высшего образования

Ханты-Мансийского автономного округа – Югры

**«Сургутский государственный университет»**

Отчет по лабораторной работе №3

**Выполнил:**

Студент 3-ого курса

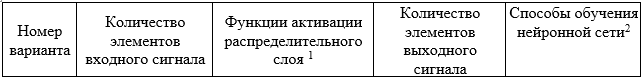
Гр. 607-91

Тунян Э.Г.

**2022 г.**

**Задания по первой лабораторной работе**

1. Изучить методические указания к первой лабораторной работе.
2. Составить схемы нейронного элемента, согласно варианту работы





1. Произвольным образом сформировать вектора входных образов (30 образов), размерностью согласно Вашему варианту.
2. Случайным образом сформировать вектора эталонных выражений (30 векторов).
3. Произвольным образом сформировать вектора весовых коэффициентов, размерностью согласно Вашему варианту.
4. Случайным образом сформировать пороговые значения для каждого нейрона.
5. Произвольным образом сформировать переменные, которые потребуются для выполнения лабораторной работы.
6. Произвести обучения нейронной сети.
7. Графически изобразить эталонные значения и значения, полученные с использованием нейронной сети (по графику для каждого способа обучения).
8. Составить отчёт по проделанной работе.

**Схема 1.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| X1 | X2 | X3 | X4 | X5 | X6 | X7 | L |
| 6 | 4 | 2 | 3 | 8 | 7 | 1 | 1 |
| 36 | 16 | 4 | 9 | 64 | 49 | 1 | 2 |
| 216 | 64 | 8 | 27 | 512 | 343 | 1 | 3 |
| 1296 | 256 | 16 | 81 | 4096 | 2401 | 1 | 4 |
| 7776 | 1024 | 32 | 243 | 32768 | 16807 | 1 | 5 |
| 46656 | 4096 | 64 | 729 | 262144 | 117649 | 1 | 6 |
| 279936 | 16384 | 128 | 2187 | 2097152 | 823543 | 1 | 7 |
| 1679616 | 65536 | 256 | 6561 | 16777216 | 5764801 | 1 | 8 |
| 10077696 | 262144 | 512 | 19683 | 1,34E+08 | 40353607 | 1 | 9 |
| 60466176 | 1048576 | 1024 | 59049 | 1,07E+09 | 2,82E+08 | 1 | 10 |
| 3,63E+08 | 4194304 | 2048 | 177147 | 8,59E+09 | 1,98E+09 | 1 | 11 |
| 2,18E+09 | 16777216 | 4096 | 531441 | 6,87E+10 | 1,38E+10 | 1 | 12 |
| 1,31E+10 | 67108864 | 8192 | 1594323 | 5,5E+11 | 9,69E+10 | 1 | 13 |
| 7,84E+10 | 2,68E+08 | 16384 | 4782969 | 4,4E+12 | 6,78E+11 | 1 | 14 |
| 4,7E+11 | 1,07E+09 | 32768 | 14348907 | 3,52E+13 | 4,75E+12 | 1 | 15 |
| 2,82E+12 | 4,29E+09 | 65536 | 43046721 | 2,81E+14 | 3,32E+13 | 1 | 16 |
| 1,69E+13 | 1,72E+10 | 131072 | 1,29E+08 | 2,25E+15 | 2,33E+14 | 1 | 17 |
| 1,02E+14 | 6,87E+10 | 262144 | 3,87E+08 | 1,8E+16 | 1,63E+15 | 1 | 18 |
| 6,09E+14 | 2,75E+11 | 524288 | 1,16E+09 | 1,44E+17 | 1,14E+16 | 1 | 19 |
| 3,66E+15 | 1,1E+12 | 1048576 | 3,49E+09 | 1,15E+18 | 7,98E+16 | 1 | 20 |
| 2,19E+16 | 4,4E+12 | 2097152 | 1,05E+10 | 9,22E+18 | 5,59E+17 | 1 | 21 |
| 1,32E+17 | 1,76E+13 | 4194304 | 3,14E+10 | 7,38E+19 | 3,91E+18 | 1 | 22 |
| 7,9E+17 | 7,04E+13 | 8388608 | 9,41E+10 | 5,9E+20 | 2,74E+19 | 1 | 23 |
| 4,74E+18 | 2,81E+14 | 16777216 | 2,82E+11 | 4,72E+21 | 1,92E+20 | 1 | 24 |
| 2,84E+19 | 1,13E+15 | 33554432 | 8,47E+11 | 3,78E+22 | 1,34E+21 | 1 | 25 |
| 1,71E+20 | 4,5E+15 | 67108864 | 2,54E+12 | 3,02E+23 | 9,39E+21 | 1 | 26 |
| 1,02E+21 | 1,8E+16 | 1,34E+08 | 7,63E+12 | 2,42E+24 | 6,57E+22 | 1 | 27 |
| 6,14E+21 | 7,21E+16 | 2,68E+08 | 2,29E+13 | 1,93E+25 | 4,6E+23 | 1 | 28 |
| 3,68E+22 | 2,88E+17 | 5,37E+08 | 6,86E+13 | 1,55E+26 | 3,22E+24 | 1 | 29 |
| 2,21E+23 | 1,15E+18 | 1,07E+09 | 2,06E+14 | 1,24E+27 | 2,25E+25 | 1 | 30 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X8 (п) | Y(эталон) | W11 | W21 | W31 | W41 | W51 | W61 | W71 |
| -1 | 7 | 42 | 28 | 14 | 21 | 56 | 49 | 7 |
| -1 | 2 | 114 | 60 | 22 | 39 | 184 | 147 | 9 |
| -1 | 7 | 1626 | 508 | 78 | 228 | 3768 | 2548 | 16 |
| -1 | 4 | 6810 | 1532 | 142 | 552 | 20152 | 12152 | 20 |
| -1 | 1 | 14586 | 2556 | 174 | 795 | 52920 | 28959 | 21 |
| -1 | 2 | 107898 | 10748 | 302 | 2253 | 577208 | 264257 | 23 |
| -1 | 4 | 1227642 | 76284 | 814 | 11001 | 8965816 | 3558429 | 27 |
| -1 | 1 | 2907258 | 141820 | 1070 | 17562 | 25743032 | 9323230 | 28 |
| -1 | 6 | 63373434 | 1714684 | 4142 | 135660 | 8,31E+08 | 2,51E+08 | 34 |
| -1 | 7 | 4,87E+08 | 9054716 | 11310 | 549003 | 8,35E+09 | 2,23E+09 | 41 |
| -1 | 6 | 2,66E+09 | 34220540 | 23598 | 1611885 | 5,99E+10 | 1,41E+10 | 47 |
| -1 | 6 | 1,57E+10 | 134883836 | 48174 | 4800531 | 4,72E+11 | 9,71E+10 | 53 |
| -1 | 2 | 4,18E+10 | 269101564 | 64558 | 7989177 | 1,57E+12 | 2,91E+11 | 55 |
| -1 | 2 | 1,99E+11 | 805972476 | 97326 | 17555115 | 1,04E+13 | 1,65E+12 | 57 |
| -1 | 4 | 2,08E+12 | 5,101E+09 | 228398 | 74950743 | 1,51E+14 | 2,06E+13 | 61 |
| -1 | 9 | 2,75E+13 | 4,376E+10 | 818222 | 4,62E+08 | 2,68E+15 | 3,2E+14 | 70 |
| -1 | 6 | 1,29E+14 | 1,468E+11 | 1604654 | 1,24E+09 | 1,62E+16 | 1,72E+15 | 76 |
| -1 | 2 | 3,32E+14 | 2,843E+11 | 2128942 | 2,01E+09 | 5,22E+16 | 4,97E+15 | 78 |
| -1 | 2 | 1,55E+15 | 8,34E+11 | 3177518 | 4,34E+09 | 3,4E+17 | 2,78E+16 | 80 |
| -1 | 5 | 1,98E+16 | 6,332E+12 | 8420398 | 2,18E+10 | 6,11E+18 | 4,27E+17 | 85 |
| -1 | 9 | 2,17E+17 | 4,591E+13 | 27294766 | 1,16E+11 | 8,91E+19 | 5,45E+18 | 94 |
| -1 | 9 | 1,4E+18 | 2,042E+14 | 65043502 | 3,98E+11 | 7,53E+20 | 4,06E+19 | 103 |
| -1 | 1 | 2,19E+18 | 2,746E+14 | 73432110 | 4,92E+11 | 1,34E+21 | 6,8E+19 | 104 |
| -1 | 5 | 2,59E+19 | 1,682E+15 | 1,57E+08 | 1,9E+12 | 2,5E+22 | 1,03E+21 | 109 |
| -1 | 6 | 1,96E+20 | 8,437E+15 | 3,59E+08 | 6,99E+12 | 2,52E+23 | 9,07E+21 | 115 |
| -1 | 3 | 7,08E+20 | 2,195E+16 | 5,6E+08 | 1,46E+13 | 1,16E+24 | 3,72E+22 | 118 |
| -1 | 7 | 7,87E+21 | 1,48E+17 | 1,5E+09 | 6,8E+13 | 1,81E+25 | 4,97E+23 | 125 |
| -1 | 1 | 1,4E+22 | 2,201E+17 | 1,77E+09 | 9,09E+13 | 3,74E+25 | 9,57E+23 | 126 |
| -1 | 6 | 2,35E+23 | 1,949E+18 | 4,99E+09 | 5,03E+14 | 9,66E+26 | 2,03E+25 | 132 |
| -1 | 7 | 1,78E+24 | 1,002E+19 | 1,25E+10 | 1,94E+15 | 9,63E+27 | 1,78E+26 | 139 |

**Схема 2.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | L |
| 6 | 4 | 2 | 3 | 8 | 7 | 1 | 5 | 1 |
| 36 | 16 | 4 | 9 | 64 | 49 | 1 | 25 | 2 |
| 216 | 64 | 8 | 27 | 512 | 343 | 1 | 125 | 3 |
| 1296 | 256 | 16 | 81 | 4096 | 2401 | 1 | 625 | 4 |
| 7776 | 1024 | 32 | 243 | 32768 | 16807 | 1 | 3125 | 5 |
| 46656 | 4096 | 64 | 729 | 262144 | 117649 | 1 | 15625 | 6 |
| 279936 | 16384 | 128 | 2187 | 2097152 | 823543 | 1 | 78125 | 7 |
| 1679616 | 65536 | 256 | 6561 | 16777216 | 5764801 | 1 | 390625 | 8 |
| 10077696 | 262144 | 512 | 19683 | 1,34E+08 | 40353607 | 1 | 1953125 | 9 |
| 60466176 | 1048576 | 1024 | 59049 | 1,07E+09 | 2,82E+08 | 1 | 9765625 | 10 |
| 3,63E+08 | 4194304 | 2048 | 177147 | 8,59E+09 | 1,98E+09 | 1 | 48828125 | 11 |
| 2,18E+09 | 16777216 | 4096 | 531441 | 6,87E+10 | 1,38E+10 | 1 | 2,44E+08 | 12 |
| 1,31E+10 | 67108864 | 8192 | 1594323 | 5,5E+11 | 9,69E+10 | 1 | 1,22E+09 | 13 |
| 7,84E+10 | 2,68E+08 | 16384 | 4782969 | 4,4E+12 | 6,78E+11 | 1 | 6,1E+09 | 14 |
| 4,7E+11 | 1,07E+09 | 32768 | 14348907 | 3,52E+13 | 4,75E+12 | 1 | 3,05E+10 | 15 |
| 2,82E+12 | 4,29E+09 | 65536 | 43046721 | 2,81E+14 | 3,32E+13 | 1 | 1,53E+11 | 16 |
| 1,69E+13 | 1,72E+10 | 131072 | 1,29E+08 | 2,25E+15 | 2,33E+14 | 1 | 7,63E+11 | 17 |
| 1,02E+14 | 6,87E+10 | 262144 | 3,87E+08 | 1,8E+16 | 1,63E+15 | 1 | 3,81E+12 | 18 |
| 6,09E+14 | 2,75E+11 | 524288 | 1,16E+09 | 1,44E+17 | 1,14E+16 | 1 | 1,91E+13 | 19 |
| 3,66E+15 | 1,1E+12 | 1048576 | 3,49E+09 | 1,15E+18 | 7,98E+16 | 1 | 9,54E+13 | 20 |
| 2,19E+16 | 4,4E+12 | 2097152 | 1,05E+10 | 9,22E+18 | 5,59E+17 | 1 | 4,77E+14 | 21 |
| 1,32E+17 | 1,76E+13 | 4194304 | 3,14E+10 | 7,38E+19 | 3,91E+18 | 1 | 2,38E+15 | 22 |
| 7,9E+17 | 7,04E+13 | 8388608 | 9,41E+10 | 5,9E+20 | 2,74E+19 | 1 | 1,19E+16 | 23 |
| 4,74E+18 | 2,81E+14 | 16777216 | 2,82E+11 | 4,72E+21 | 1,92E+20 | 1 | 5,96E+16 | 24 |
| 2,84E+19 | 1,13E+15 | 33554432 | 8,47E+11 | 3,78E+22 | 1,34E+21 | 1 | 2,98E+17 | 25 |
| 1,71E+20 | 4,5E+15 | 67108864 | 2,54E+12 | 3,02E+23 | 9,39E+21 | 1 | 1,49E+18 | 26 |
| 1,02E+21 | 1,8E+16 | 1,34E+08 | 7,63E+12 | 2,42E+24 | 6,57E+22 | 1 | 7,45E+18 | 27 |
| 6,14E+21 | 7,21E+16 | 2,68E+08 | 2,29E+13 | 1,93E+25 | 4,6E+23 | 1 | 3,73E+19 | 28 |
| 3,68E+22 | 2,88E+17 | 5,37E+08 | 6,86E+13 | 1,55E+26 | 3,22E+24 | 1 | 1,86E+20 | 29 |
| 2,21E+23 | 1,15E+18 | 1,07E+09 | 2,06E+14 | 1,24E+27 | 2,25E+25 | 1 | 9,31E+20 | 30 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X9 (п) | Y(эталон) | W11 | W21 | W31 | W41 | W51 | W61 | W71 | W81 |
| -1 | 7 | 42 | 28 | 14 | 21 | 56 | 49 | 7 | 35 |
| -1 | 2 | 114 | 60 | 22 | 39 | 184 | 147 | 9 | 85 |
| -1 | 7 | 1626 | 508 | 78 | 228 | 3768 | 2548 | 16 | 960 |
| -1 | 4 | 6810 | 1532 | 142 | 552 | 20152 | 12152 | 20 | 3460 |
| -1 | 1 | 14586 | 2556 | 174 | 795 | 52920 | 28959 | 21 | 6585 |
| -1 | 2 | 107898 | 10748 | 302 | 2253 | 577208 | 264257 | 23 | 37835 |
| -1 | 4 | 1227642 | 76284 | 814 | 11001 | 8965816 | 3558429 | 27 | 350335 |
| -1 | 1 | 2907258 | 141820 | 1070 | 17562 | 25743032 | 9323230 | 28 | 740960 |
| -1 | 6 | 63373434 | 1714684 | 4142 | 135660 | 8,31E+08 | 2,51E+08 | 34 | 12459710 |
| -1 | 7 | 4,87E+08 | 9054716 | 11310 | 549003 | 8,35E+09 | 2,23E+09 | 41 | 80819085 |
| -1 | 6 | 2,66E+09 | 34220540 | 23598 | 1611885 | 5,99E+10 | 1,41E+10 | 47 | 3,74E+08 |
| -1 | 6 | 1,57E+10 | 1,35E+08 | 48174 | 4800531 | 4,72E+11 | 9,71E+10 | 53 | 1,84E+09 |
| -1 | 2 | 4,18E+10 | 2,69E+08 | 64558 | 7989177 | 1,57E+12 | 2,91E+11 | 55 | 4,28E+09 |
| -1 | 2 | 1,99E+11 | 8,06E+08 | 97326 | 17555115 | 1,04E+13 | 1,65E+12 | 57 | 1,65E+10 |
| -1 | 4 | 2,08E+12 | 5,1E+09 | 228398 | 74950743 | 1,51E+14 | 2,06E+13 | 61 | 1,39E+11 |
| -1 | 9 | 2,75E+13 | 4,38E+10 | 818222 | 4,62E+08 | 2,68E+15 | 3,2E+14 | 70 | 1,51E+12 |
| -1 | 6 | 1,29E+14 | 1,47E+11 | 1604654 | 1,24E+09 | 1,62E+16 | 1,72E+15 | 76 | 6,09E+12 |
| -1 | 2 | 3,32E+14 | 2,84E+11 | 2128942 | 2,01E+09 | 5,22E+16 | 4,97E+15 | 78 | 1,37E+13 |
| -1 | 2 | 1,55E+15 | 8,34E+11 | 3177518 | 4,34E+09 | 3,4E+17 | 2,78E+16 | 80 | 5,19E+13 |
| -1 | 5 | 1,98E+16 | 6,33E+12 | 8420398 | 2,18E+10 | 6,11E+18 | 4,27E+17 | 85 | 5,29E+14 |
| -1 | 9 | 2,17E+17 | 4,59E+13 | 27294766 | 1,16E+11 | 8,91E+19 | 5,45E+18 | 94 | 4,82E+15 |
| -1 | 9 | 1,4E+18 | 2,04E+14 | 65043502 | 3,98E+11 | 7,53E+20 | 4,06E+19 | 103 | 2,63E+16 |
| -1 | 1 | 2,19E+18 | 2,75E+14 | 73432110 | 4,92E+11 | 1,34E+21 | 6,8E+19 | 104 | 3,82E+16 |
| -1 | 5 | 2,59E+19 | 1,68E+15 | 1,57E+08 | 1,9E+12 | 2,5E+22 | 1,03E+21 | 109 | 3,36E+17 |
| -1 | 6 | 1,96E+20 | 8,44E+15 | 3,59E+08 | 6,99E+12 | 2,52E+23 | 9,07E+21 | 115 | 2,12E+18 |
| -1 | 3 | 7,08E+20 | 2,19E+16 | 5,6E+08 | 1,46E+13 | 1,16E+24 | 3,72E+22 | 118 | 6,59E+18 |
| -1 | 7 | 7,87E+21 | 1,48E+17 | 1,5E+09 | 6,8E+13 | 1,81E+25 | 4,97E+23 | 125 | 5,87E+19 |
| -1 | 1 | 1,4E+22 | 2,2E+17 | 1,77E+09 | 9,09E+13 | 3,74E+25 | 9,57E+23 | 126 | 9,6E+19 |
| -1 | 6 | 2,35E+23 | 1,95E+18 | 4,99E+09 | 5,03E+14 | 9,66E+26 | 2,03E+25 | 132 | 1,21E+21 |
| -1 | 7 | 1,78E+24 | 1E+19 | 1,25E+10 | 1,94E+15 | 9,63E+27 | 1,78E+26 | 139 | 7,73E+21 |

**Схема 3.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X1 | X2 | X3 | X4 | X5 | X6 | X7 |
| 6 | 4 | 2 | 3 | 8 | 7 | 1 |
| 36 | 16 | 4 | 9 | 64 | 49 | 1 |
| 216 | 64 | 8 | 27 | 512 | 343 | 1 |
| 1296 | 256 | 16 | 81 | 4096 | 2401 | 1 |
| 7776 | 1024 | 32 | 243 | 32768 | 16807 | 1 |
| 46656 | 4096 | 64 | 729 | 262144 | 117649 | 1 |
| 279936 | 16384 | 128 | 2187 | 2097152 | 823543 | 1 |
| 1679616 | 65536 | 256 | 6561 | 16777216 | 5764801 | 1 |
| 10077696 | 262144 | 512 | 19683 | 1,34E+08 | 40353607 | 1 |
| 60466176 | 1048576 | 1024 | 59049 | 1,07E+09 | 2,82E+08 | 1 |
| 3,63E+08 | 4194304 | 2048 | 177147 | 8,59E+09 | 1,98E+09 | 1 |
| 2,18E+09 | 16777216 | 4096 | 531441 | 6,87E+10 | 1,38E+10 | 1 |
| 1,31E+10 | 67108864 | 8192 | 1594323 | 5,5E+11 | 9,69E+10 | 1 |
| 7,84E+10 | 2,68E+08 | 16384 | 4782969 | 4,4E+12 | 6,78E+11 | 1 |
| 4,7E+11 | 1,07E+09 | 32768 | 14348907 | 3,52E+13 | 4,75E+12 | 1 |
| 2,82E+12 | 4,29E+09 | 65536 | 43046721 | 2,81E+14 | 3,32E+13 | 1 |
| 1,69E+13 | 1,72E+10 | 131072 | 1,29E+08 | 2,25E+15 | 2,33E+14 | 1 |
| 1,02E+14 | 6,87E+10 | 262144 | 3,87E+08 | 1,8E+16 | 1,63E+15 | 1 |
| 6,09E+14 | 2,75E+11 | 524288 | 1,16E+09 | 1,44E+17 | 1,14E+16 | 1 |
| 3,66E+15 | 1,1E+12 | 1048576 | 3,49E+09 | 1,15E+18 | 7,98E+16 | 1 |
| 2,19E+16 | 4,4E+12 | 2097152 | 1,05E+10 | 9,22E+18 | 5,59E+17 | 1 |
| 1,32E+17 | 1,76E+13 | 4194304 | 3,14E+10 | 7,38E+19 | 3,91E+18 | 1 |
| 7,9E+17 | 7,04E+13 | 8388608 | 9,41E+10 | 5,9E+20 | 2,74E+19 | 1 |
| 4,74E+18 | 2,81E+14 | 16777216 | 2,82E+11 | 4,72E+21 | 1,92E+20 | 1 |
| 2,84E+19 | 1,13E+15 | 33554432 | 8,47E+11 | 3,78E+22 | 1,34E+21 | 1 |
| 1,71E+20 | 4,5E+15 | 67108864 | 2,54E+12 | 3,02E+23 | 9,39E+21 | 1 |
| 1,02E+21 | 1,8E+16 | 1,34E+08 | 7,63E+12 | 2,42E+24 | 6,57E+22 | 1 |
| 6,14E+21 | 7,21E+16 | 2,68E+08 | 2,29E+13 | 1,93E+25 | 4,6E+23 | 1 |
| 3,68E+22 | 2,88E+17 | 5,37E+08 | 6,86E+13 | 1,55E+26 | 3,22E+24 | 1 |
| 2,21E+23 | 1,15E+18 | 1,07E+09 | 2,06E+14 | 1,24E+27 | 2,25E+25 | 1 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X8 | X9 | X10 | X11 | X12 | X13 | L |
| 5 | 7 | 4 | 1 | 11 | 9 | 1 |
| 25 | 49 | 16 | 1 | 121 | 81 | 2 |
| 125 | 343 | 64 | 1 | 1331 | 729 | 3 |
| 625 | 2401 | 256 | 1 | 14641 | 6561 | 4 |
| 3125 | 16807 | 1024 | 1 | 161051 | 59049 | 5 |
| 15625 | 117649 | 4096 | 1 | 1771561 | 531441 | 6 |
| 78125 | 823543 | 16384 | 1 | 19487171 | 4782969 | 7 |
| 390625 | 5764801 | 65536 | 1 | 2,14E+08 | 43046721 | 8 |
| 1953125 | 40353607 | 262144 | 1 | 2,36E+09 | 3,87E+08 | 9 |
| 9765625 | 2,82E+08 | 1048576 | 1 | 2,59E+10 | 3,49E+09 | 10 |
| 48828125 | 1,98E+09 | 4194304 | 1 | 2,85E+11 | 3,14E+10 | 11 |
| 2,44E+08 | 1,38E+10 | 16777216 | 1 | 3,14E+12 | 2,82E+11 | 12 |
| 1,22E+09 | 9,69E+10 | 67108864 | 1 | 3,45E+13 | 2,54E+12 | 13 |
| 6,1E+09 | 6,78E+11 | 2,68E+08 | 1 | 3,8E+14 | 2,29E+13 | 14 |
| 3,05E+10 | 4,75E+12 | 1,07E+09 | 1 | 4,18E+15 | 2,06E+14 | 15 |
| 1,53E+11 | 3,32E+13 | 4,29E+09 | 1 | 4,59E+16 | 1,85E+15 | 16 |
| 7,63E+11 | 2,33E+14 | 1,72E+10 | 1 | 5,05E+17 | 1,67E+16 | 17 |
| 3,81E+12 | 1,63E+15 | 6,87E+10 | 1 | 5,56E+18 | 1,5E+17 | 18 |
| 1,91E+13 | 1,14E+16 | 2,75E+11 | 1 | 6,12E+19 | 1,35E+18 | 19 |
| 9,54E+13 | 7,98E+16 | 1,1E+12 | 1 | 6,73E+20 | 1,22E+19 | 20 |
| 4,77E+14 | 5,59E+17 | 4,4E+12 | 1 | 7,4E+21 | 1,09E+20 | 21 |
| 2,38E+15 | 3,91E+18 | 1,76E+13 | 1 | 8,14E+22 | 9,85E+20 | 22 |
| 1,19E+16 | 2,74E+19 | 7,04E+13 | 1 | 8,95E+23 | 8,86E+21 | 23 |
| 5,96E+16 | 1,92E+20 | 2,81E+14 | 1 | 9,85E+24 | 7,98E+22 | 24 |
| 2,98E+17 | 1,34E+21 | 1,13E+15 | 1 | 1,08E+26 | 7,18E+23 | 25 |
| 1,49E+18 | 9,39E+21 | 4,5E+15 | 1 | 1,19E+27 | 6,46E+24 | 26 |
| 7,45E+18 | 6,57E+22 | 1,8E+16 | 1 | 1,31E+28 | 5,81E+25 | 27 |
| 3,73E+19 | 4,6E+23 | 7,21E+16 | 1 | 1,44E+29 | 5,23E+26 | 28 |
| 1,86E+20 | 3,22E+24 | 2,88E+17 | 1 | 1,59E+30 | 4,71E+27 | 29 |
| 9,31E+20 | 2,25E+25 | 1,15E+18 | 1 | 1,74E+31 | 4,24E+28 | 30 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X14 (п) | Y(эталон) | W11 | W21 | W31 | W41 | W51 |
| -1 | 7 | 42 | 28 | 14 | 21 | 56 |
| -1 | 2 | 114 | 60 | 22 | 39 | 184 |
| -1 | 7 | 1626 | 508 | 78 | 228 | 3768 |
| -1 | 4 | 6810 | 1532 | 142 | 552 | 20152 |
| -1 | 1 | 14586 | 2556 | 174 | 795 | 52920 |
| -1 | 2 | 107898 | 10748 | 302 | 2253 | 577208 |
| -1 | 4 | 1227642 | 76284 | 814 | 11001 | 8965816 |
| -1 | 1 | 2907258 | 141820 | 1070 | 17562 | 25743032 |
| -1 | 6 | 63373434 | 1714684 | 4142 | 135660 | 8,31E+08 |
| -1 | 7 | 4,87E+08 | 9054716 | 11310 | 549003 | 8,35E+09 |
| -1 | 6 | 2,66E+09 | 34220540 | 23598 | 1611885 | 5,99E+10 |
| -1 | 6 | 1,57E+10 | 1,35E+08 | 48174 | 4800531 | 4,72E+11 |
| -1 | 2 | 4,18E+10 | 2,69E+08 | 64558 | 7989177 | 1,57E+12 |
| -1 | 2 | 1,99E+11 | 8,06E+08 | 97326 | 17555115 | 1,04E+13 |
| -1 | 4 | 2,08E+12 | 5,1E+09 | 228398 | 74950743 | 1,51E+14 |
| -1 | 9 | 2,75E+13 | 4,38E+10 | 818222 | 4,62E+08 | 2,68E+15 |
| -1 | 6 | 1,29E+14 | 1,47E+11 | 1604654 | 1,24E+09 | 1,62E+16 |
| -1 | 2 | 3,32E+14 | 2,84E+11 | 2128942 | 2,01E+09 | 5,22E+16 |
| -1 | 2 | 1,55E+15 | 8,34E+11 | 3177518 | 4,34E+09 | 3,4E+17 |
| -1 | 5 | 1,98E+16 | 6,33E+12 | 8420398 | 2,18E+10 | 6,11E+18 |
| -1 | 9 | 2,17E+17 | 4,59E+13 | 27294766 | 1,16E+11 | 8,91E+19 |
| -1 | 9 | 1,4E+18 | 2,04E+14 | 65043502 | 3,98E+11 | 7,53E+20 |
| -1 | 1 | 2,19E+18 | 2,75E+14 | 73432110 | 4,92E+11 | 1,34E+21 |
| -1 | 5 | 2,59E+19 | 1,68E+15 | 1,57E+08 | 1,9E+12 | 2,5E+22 |
| -1 | 6 | 1,96E+20 | 8,44E+15 | 3,59E+08 | 6,99E+12 | 2,52E+23 |
| -1 | 3 | 7,08E+20 | 2,19E+16 | 5,6E+08 | 1,46E+13 | 1,16E+24 |
| -1 | 7 | 7,87E+21 | 1,48E+17 | 1,5E+09 | 6,8E+13 | 1,81E+25 |
| -1 | 1 | 1,4E+22 | 2,2E+17 | 1,77E+09 | 9,09E+13 | 3,74E+25 |
| -1 | 6 | 2,35E+23 | 1,95E+18 | 4,99E+09 | 5,03E+14 | 9,66E+26 |
| -1 | 7 | 1,78E+24 | 1E+19 | 1,25E+10 | 1,94E+15 | 9,63E+27 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| W61 | W71 | W81 | W91 | W101 | W111 | W121 | W131 | T |
| 49 | 7 | 35 | 49 | 28 | 7 | 77 | 63 | -7 |
| 147 | 9 | 85 | 147 | 60 | 9 | 319 | 225 | -9 |
| 2548 | 16 | 960 | 2548 | 508 | 16 | 9636 | 5328 | -16 |
| 12152 | 20 | 3460 | 12152 | 1532 | 20 | 68200 | 31572 | -20 |
| 28959 | 21 | 6585 | 28959 | 2556 | 21 | 229251 | 90621 | -21 |
| 264257 | 23 | 37835 | 264257 | 10748 | 23 | 3772373 | 1153503 | -23 |
| 3558429 | 27 | 350335 | 3558429 | 76284 | 27 | 81721057 | 20285379 | -27 |
| 9323230 | 28 | 740960 | 9323230 | 141820 | 28 | 2,96E+08 | 63332100 | -28 |
| 2,51E+08 | 34 | 12459710 | 2,51E+08 | 1714684 | 34 | 1,44E+10 | 2,39E+09 | -34 |
| 2,23E+09 | 41 | 80819085 | 2,23E+09 | 9054716 | 41 | 1,96E+11 | 2,68E+10 | -41 |
| 1,41E+10 | 47 | 3,74E+08 | 1,41E+10 | 34220540 | 47 | 1,91E+12 | 2,15E+11 | -47 |
| 9,71E+10 | 53 | 1,84E+09 | 9,71E+10 | 1,35E+08 | 53 | 2,07E+13 | 1,91E+12 | -53 |
| 2,91E+11 | 55 | 4,28E+09 | 2,91E+11 | 2,69E+08 | 55 | 8,98E+13 | 6,99E+12 | -55 |
| 1,65E+12 | 57 | 1,65E+10 | 1,65E+12 | 8,06E+08 | 57 | 8,49E+14 | 5,27E+13 | -57 |
| 2,06E+13 | 61 | 1,39E+11 | 2,06E+13 | 5,1E+09 | 61 | 1,76E+16 | 8,76E+14 | -61 |
| 3,2E+14 | 70 | 1,51E+12 | 3,2E+14 | 4,38E+10 | 70 | 4,31E+17 | 1,76E+16 | -70 |
| 1,72E+15 | 76 | 6,09E+12 | 1,72E+15 | 1,47E+11 | 76 | 3,46E+18 | 1,18E+17 | -76 |
| 4,97E+15 | 78 | 1,37E+13 | 4,97E+15 | 2,84E+11 | 78 | 1,46E+19 | 4,18E+17 | -78 |
| 2,78E+16 | 80 | 5,19E+13 | 2,78E+16 | 8,34E+11 | 80 | 1,37E+20 | 3,12E+18 | -80 |
| 4,27E+17 | 85 | 5,29E+14 | 4,27E+17 | 6,33E+12 | 85 | 3,5E+21 | 6,39E+19 | -85 |
| 5,45E+18 | 94 | 4,82E+15 | 5,45E+18 | 4,59E+13 | 94 | 7,01E+22 | 1,05E+21 | -94 |
| 4,06E+19 | 103 | 2,63E+16 | 4,06E+19 | 2,04E+14 | 103 | 8,03E+23 | 9,91E+21 | -103 |
| 6,8E+19 | 104 | 3,82E+16 | 6,8E+19 | 2,75E+14 | 104 | 1,7E+24 | 1,88E+22 | -104 |
| 1,03E+21 | 109 | 3,36E+17 | 1,03E+21 | 1,68E+15 | 109 | 5,09E+25 | 4,18E+23 | -109 |
| 9,07E+21 | 115 | 2,12E+18 | 9,07E+21 | 8,44E+15 | 115 | 7,01E+26 | 4,72E+24 | -115 |
| 3,72E+22 | 118 | 6,59E+18 | 3,72E+22 | 2,19E+16 | 118 | 4,28E+27 | 2,41E+25 | -118 |
| 4,97E+23 | 125 | 5,87E+19 | 4,97E+23 | 1,48E+17 | 125 | 9,6E+28 | 4,31E+26 | -125 |
| 9,57E+23 | 126 | 9,6E+19 | 9,57E+23 | 2,2E+17 | 126 | 2,4E+29 | 9,55E+26 | -126 |
| 2,03E+25 | 132 | 1,21E+21 | 2,03E+25 | 1,95E+18 | 132 | 9,76E+30 | 2,92E+28 | -132 |
| 1,78E+26 | 139 | 7,73E+21 | 1,78E+26 | 1E+19 | 139 | 1,32E+32 | 3,26E+29 | -139 |