1. POWER OF THE SET OF PRIME NUMBERS:

As a proof of the claim I have made (postulate), I intend to present to you a way to calculate the power of a set of prime numbers, i.e. an algorithm that allows us to determine the number of primes proper within a given numerical range $(0, x)$. This is the so-called "theorem on prime numbers".

Of course, I will base my proof on the equations derived in my innovative scientific work „Distribution of prime numbers".

								-1	m	1								
	8	7	6	5	4	3	2	1	d	1	2	3	4	5	6	7	8	
	+48k	+42k	+36k	+30k	+24k	+18k	+12k	+6k	1	+6k	+12k	+18k	+24k	+30k	+36k	+42k	+48k	+54k
	-343	-301	-259	-217	-175	-133	-91	-49	-7	35	77	119	161	203	245	287	329	371
	49	43	37	31	25	19	13	7	w	5	11	17	23	29	35	41	47	53

Fig. 4. Generation of multiples– numbers u_r fo the number p_r = 7.
(w – nth multiples, d i m – coefficients from equation (11)).

The "prime number theorem" defining the power of the set $\pi(n)$ is a serious problem to this day. The value of the result of this equation is burdened with an error, and its size decreases asymptotically when $n \to +\infty$.

$$\pi(n) \approx \frac{n}{\log(n)} \tag{13}$$

To this day, it has not been possible to design a formula that would unambiguously and without error calculate the number of prime numbers in the set of whole numbers. Therefore, my observations can become an innovative way to deal with this issue.

<u>ASSUMPTIONS:</u>

1) It is obvious that prime numbers are searched for odd numbers, the sum of which is not divisible by 3, which is unequivocally looking for them among the numbers that are part of the set Z_r.
2) The number x is the right edge of the set being examined $(0, x >$, which we will consider in terms of the number of prime numbers proper.

POSTULATE 2:

If the number x is divided by 5 (the first first proper number of the set Z_r) we get the right boundary of the set $(0, \frac{x}{5} >$, which will contain numbers z_r affecting the generation of all numbers u_r in the entire collection space $(0, x >$.

EXAMPLE 1:

1) Let x be 77.
2) If we divide 77 into 5 we get 15,4.
3) We quickly notice that in a set of integers $(0{,}15 >$ there are four numbers $z_r : \{\ 5{,}7{,}11{,}13\ \} \in (0{,}15 >$.
4) According to the above postulate, these numbers suffice to determine all numbers u_r located in the whole space of the set $(0, x >$.
5) Below I present a list of all combinations of numbers u_r resulting from numbers $\{\ 5{,}7{,}11{,}13\ \}$ (products of pairs of numbers z_r):

$$\begin{gathered} \mathbf{5\ x\ 5 = 25} \\ \mathbf{5\ x\ 7 = 35} \\ \mathbf{5\ x\ 11 = 55} \\ \mathbf{5\ x\ 13 = 65} \\ \mathbf{7\ x\ 7 = 49} \\ \mathbf{7\ x\ 11 = 77} \\ 7\ x\ 13 = 91 \\ 11\ x\ 11 = 121 \\ 11\ x\ 13 = 143 \\ 13\ x\ 13 = 169 \end{gathered} \qquad (14)$$

It is worth noting that all (**in bold**) above the results are exactly a two-element combination with repetitions from the $n -$ element set, in this case a four-element set. It is important to reject mirror combinations, i.e. ab and ba are treated as twin combinations. The formula for the number of two-element combinations from a four-element set is shown below:

$$C_n^k = \binom{k+n-1}{k} = \frac{(k+n-1)!}{k!\ (n-1)!} = \frac{(2+4-1)}{2!\,(4-1)!} = 10 \qquad (15)$$

Let's look ...

In the above-mentioned example, we have affect with the number z_r small sizes. Questions arise as to how subsections 3 and 7 will be solved in case of much larger numbers z_r.

In this case, I will present you two ways to solve these doubts, and their order will not be accidental, because the below presented mathematical calculator will be a good reference and visualization of theoretical mathematical calculations:

- mathematical calculator (based on the EXCEL program from the MS Office package) using the above-mentioned formulas and theoretical relations;
- theoretical (using mathematical calculations);

MATHEMATICAL CALCULATOR:

In order to solve the problem related to the power of prime numbers, I used the EXCEL program from the MS Office suite, which according to my person is a great and extremely versatile tool useful not only in the world of mathematics.

In the further part of my research I intend to introduce to you step by step the algorithm used to determine the power of the set of natural numbers:

<u>STEP 1.</u>

Let us assume that for the experiment $x = 1411$.

<u>STEP 2.</u>

Let's build a numerical table whose elements u_r are multiples of all numbers z_r determined in postulate No. 2. This table will therefore have sizes (Figure 5):

a. height: 93
   - ✓ the number of rows in the numeric table should be consistent with the number of numbers z_r falling within the range $(0, \frac{x}{5} >$, it means $(0; 282,6 >$,

a. width: 12
   - ✓ the number of columns in the numeric table should be consistent with the number of numbers z_r falling within the range $(0, \sqrt{x} >$, it means $(0; 37,6 >$,

		1	2	3	4	5	6	7	8	9	10	11	12
5	1	25	49	121	169	289	361	529	625	841	961	1225	1369
7	2	35	77	143	221	323	437	575	725	899	1085	1295	1517
11	3	55	91	187	247	391	475	667	775	1015	1147	1435	1591
13	4	65	119	209	299	425	551	713	875	1073	1271	1505	1739
17	5	85	133	253	325	493	589	805	925	1189	1333	1645	1813
19	6	95	161	275	377	527	665	851	1025	1247	1457	1715	1961
23	7	115	175	319	403	595	703	943	1075	1363	1519	1855	2035
25	8	125	203	341	455	629	779	989	1175	1421	1643	1925	2183
29	9	145	217	385	481	697	817	1081	1225	1537	1705	2065	2257
31	10	155	245	407	533	731	893	1127	1325	1595	1829	2135	2405
35	11	175	259	451	559	799	931	1219	1375	1711	1891	2275	2479
37	12	185	287	473	611	833	1007	1265	1475	1769	2015	2345	2627
41	13	205	301	517	637	901	1045	1357	1525	1885	2077	2485	2701
43	14	215	329	539	689	935	1121	1403	1625	1943	2201	2555	2849
47	15	235	343	583	715	1003	1159	1495	1675	2059	2263	2695	2923
49	16	245	371	605	767	1037	1235	1541	1775	2117	2387	2765	3071
53	17	265	385	649	793	1105	1273	1633	1825	2233	2449	2905	3145
55	18	275	413	671	845	1139	1349	1679	1925	2291	2573	2975	3293
59	19	295	427	715	871	1207	1387	1771	1975	2407	2635	3115	3367
61	20	305	455	737	923	1241	1463	1817	2075	2465	2759	3185	3515
65	21	325	469	781	949	1309	1501	1909	2125	2581	2821	3325	3589
67	22	335	497	803	1001	1343	1577	1955	2225	2639	2945	3395	3737
71	23	355	511	847	1027	1411	1615	2047	2275	2755	3007	3535	3811
73	24	365	539	869	1079	1445	1691	2093	2375	2813	3131	3605	3959
77	25	385	553	913	1105	1513	1729	2185	2425	2929	3193	3745	4033
79	26	395	581	935	1157	1547	1805	2231	2525	2987	3317	3815	4181
83	27	415	595	979	1183	1615	1843	2323	2575	3103	3379	3955	4255
85	28	425	623	1001	1235	1649	1919	2369	2675	3161	3503	4025	4403
89	29	445	637	1045	1261	1717	1957	2461	2725	3277	3565	4165	4477
91	30	455	665	1067	1313	1751	2033	2507	2825	3335	3689	4235	4625
95	31	475	679	1111	1339	1819	2071	2599	2875	3451	3751	4375	4699
97	32	485	707	1133	1391	1853	2147	2645	2975	3509	3875	4445	4847
101	33	505	721	1177	1417	1921	2185	2737	3025	3625	3937	4585	4921
103	34	515	749	1199	1469	1955	2261	2783	3125	3683	4061	4655	5069
107	35	535	763	1243	1495	2023	2299	2875	3175	3799	4123	4795	5143
109	36	545	791	1265	1547	2057	2375	2921	3275	3857	4247	4865	5291
113	37	565	805	1309	1573	2125	2413	3013	3325	3973	4309	5005	5365
115	38	575	833	1331	1625	2159	2489	3059	3425	4031	4433	5075	5513
119	39	595	847	1375	1651	2227	2527	3151	3475	4147	4495	5215	5587
121	40	605	875	1397	1703	2261	2603	3197	3575	4205	4619	5285	5735
125	41	625	889	1441	1729	2329	2641	3289	3625	4321	4681	5425	5809
127	42	635	917	1463	1781	2363	2717	3335	3725	4379	4805	5495	5957
131	43	655	931	1507	1807	2431	2755	3427	3775	4495	4867	5635	6031
133	44	665	959	1529	1859	2465	2831	3473	3875	4553	4991	5705	6179
137	45	685	973	1573	1885	2533	2869	3565	3925	4669	5053	5845	6253
139	46	695	1001	1595	1937	2567	2945	3611	4025	4727	5177	5915	6401
143	47	715	1015	1639	1963	2635	2983	3703	4075	4843	5239	6055	6475
145	48	725	1043	1661	2015	2669	3059	3749	4175	4901	5363	6125	6623
149	49	745	1057	1705	2041	2737	3097	3841	4225	5017	5425	6265	6697
151	50	755	1085	1727	2093	2771	3173	3887	4325	5075	5549	6335	6845
155	51	775	1099	1771	2119	2839	3211	3979	4375	5191	5611	6475	6919
157	52	785	1127	1793	2171	2873	3287	4025	4475	5249	5735	6545	7067
161	53	805	1141	1837	2197	2941	3325	4117	4525	5365	5797	6685	7141
163	54	815	1169	1859	2249	2975	3401	4163	4625	5423	5921	6755	7289
167	55	835	1183	1903	2275	3043	3439	4255	4675	5539	5983	6895	7363
169	56	845	1211	1925	2327	3077	3515	4301	4775	5597	6107	6965	7511
173	57	865	1225	1969	2353	3145	3553	4393	4825	5713	6169	7105	7585
175	58	875	1253	1991	2405	3179	3629	4439	4925	5771	6293	7175	7733
179	59	895	1267	2035	2431	3247	3667	4531	4975	5887	6355	7315	7807
181	60	905	1295	2057	2483	3281	3743	4577	5075	5945	6479	7385	7955
185	61	925	1309	2101	2509	3349	3781	4669	5125	6061	6541	7525	8029
187	62	935	1337	2123	2561	3383	3857	4715	5225	6119	6665	7595	8177
191	63	955	1351	2167	2587	3451	3895	4807	5275	6235	6727	7735	8251
193	64	965	1379	2189	2639	3485	3971	4853	5375	6293	6851	7805	8399
197	65	985	1393	2233	2665	3553	4009	4945	5425	6409	6913	7945	8473
199	66	995	1421	2255	2717	3587	4085	4991	5525	6467	7037	8015	8621
203	67	1015	1435	2299	2743	3655	4123	5083	5575	6583	7099	8155	8695
205	68	1025	1463	2321	2795	3689	4199	5129	5675	6641	7223	8225	8843
209	69	1045	1477	2365	2821	3757	4237	5221	5725	6757	7285	8365	8917
211	70	1055	1505	2387	2873	3791	4313	5267	5825	6815	7409	8435	9065
215	71	1075	1519	2431	2899	3859	4351	5359	5875	6931	7471	8575	9139
217	72	1085	1547	2453	2951	3893	4427	5405	5975	6989	7595	8645	9287
221	73	1105	1561	2497	2977	3961	4465	5497	6025	7105	7657	8785	9361
223	74	1115	1589	2519	3029	3995	4541	5543	6125	7163	7781	8855	9509
227	75	1135	1603	2563	3055	4063	4579	5635	6175	7279	7843	8995	9583
229	76	1145	1631	2585	3107	4097	4655	5681	6275	7337	7967	9065	9731
233	77	1165	1645	2629	3133	4165	4693	5773	6325	7453	8029	9205	9805
235	78	1175	1673	2651	3185	4199	4769	5819	6425	7511	8153	9275	9953
239	79	1195	1687	2695	3211	4267	4807	5911	6475	7627	8215	9415	10027
241	80	1205	1715	2717	3263	4301	4883	5957	6575	7685	8339	9485	10175
245	81	1225	1729	2761	3289	4369	4921	6049	6625	7801	8401	9625	10249
247	82	1235	1757	2783	3341	4403	4997	6095	6725	7859	8525	9695	10397
251	83	1255	1771	2827	3367	4471	5035	6187	6775	7975	8587	9835	10471
253	84	1265	1799	2849	3419	4505	5111	6233	6875	8033	8711	9905	0
257	85	1285	1813	2893	3445	4573	5149	6325	6925	8149	8773	0	0
259	86	1295	1841	2915	3497	4607	5225	6371	7025	8207	0	0	0
263	87	1315	1855	2959	3523	4675	5263	6463	7075	0	0	0	0
265	88	1325	1883	2981	3575	4709	5339	6509	0	0	0	0	0
269	89	1345	1897	3025	3601	4777	5377	0	0	0	0	0	0
271	90	1355	1925	3047	3653	4811	0	0	0	0	0	0	0
275	91	1375	1939	3091	3679	0	0	0	0	0	0	0	0
277	92	1385	1967	3113	0	0	0	0	0	0	0	0	0
281	93	1405	1981	0	0	0	0	0	0	0	0	0	0

Fig.5. Tabular summary of numbers u_r generated from numbers z_r - postulate No 2.

- with red in the tabular summary of numbers u_r (Figure 5.), check the repeated numbers being the results of a two-element combination with the repetitions from the numbers z_r in the range $(0, \frac{x}{5} >$ and affecting the generation of numbers u_r in the range $(0, x >$;
- for this purpose, let us use conditional formatting (one of the interesting functions of the EXCEL program) to capture duplicate values of the number u_r;
- please note that in the first row of the table there are only numbers z_r raised to the square. Because in the tabular summary we do not capture the results of the two-element combinations being their mirror reflection in the record (reminder: the $ab = ba$ combination);
- the idea of tabular summary of numbers u_r (Figure 6a, 6b) presents schemes:

	a	b	c	d	e	f	g	h	i	j
a	aa	ab	ac	ad	ae	af	ag	ah	ai	aj
b	ba	bb	bc	bd	be	bf	bg	bh	bi	bj
c	ca	cb	cc	cd	ce	cf	cg	ch	ci	cj
d	da	db	dc	dd	de	df	dg	dh	di	dj
e	ea	eb	dc	ed	ee	ef	eg	eh	ei	ej
f	fa	fb	fc	fd	fe	ff	fg	fh	fi	fj
g	ga	gb	gc	gd	ge	gf	gg	gh	gi	gj
h	ha	hb	hc	hd	he	hf	hg	hh	hi	hj
i	ia	ib	ic	id	ie	if	ig	ih	ii	ij
j	ja	jb	jc	jd	je	jf	jg	jh	ji	jj

Fig. 6a. The idea tabular summary *of number* u_r *- postulate No. 2.*
(tabular sets of numbers u_r *represent only the above-mentioned black boxes)*

	a	b	c	d	e	f	g	h	i	j
a	aa	bb	cc	dd	ee	ff	gg	hh	ii	jj
b	ba	cb	dc	ed	fe	gf	hg	ih	ji	0
c	ca	db	dc	fd	ge	hf	ig	jh	0	0
d	da	eb	fc	gd	he	if	jg	0	0	0
e	ea	fb	gc	hd	ie	jf	0	0	0	0
f	fa	gb	hc	id	je	0	0	0	0	0
g	ga	hb	ic	jd	0	0	0	0	0	0
h	ha	ib	jc	0	0	0	0	0	0	0
i	ia	jb	0	0	0	0	0	0	0	0
j	ja	0	0	0	0	0	0	0	0	0

Fig. 6b. The idea tabular summary *of number* u_r *- postulate No. 2.*
(after changing cell values - field conversion)

STEP 3.

Marking (underlining) only those values of numbers u_r, which are within the tested range $(0, x >$.

- for this purpose, let's also use conditional formatting to mark values of numbers u_r less or equal to x.

		1	2	3	4	5	6	7	8	9	10	11	12
5	1	25	49	121	169	289	361	529	625	841	961	1225	1369
7	2	35	77	143	221	323	437	575	725	899	1085	1295	1517
11	3	55	91	187	247	391	475	667	775	1015	1147	1435	1591
13	4	65	119	209	299	425	551	713	875	1073	1271	1505	1739
17	5	85	133	253	325	493	589	805	925	1189	1333	1645	1813
19	6	95	161	275	377	527	665	851	1025	1247	1457	1715	1961
23	7	115	175	319	403	595	703	943	1075	1363	1519	1855	2035
25	8	125	203	341	455	629	779	989	1175	1421	1643	1925	2183
29	9	145	217	385	481	697	817	1081	1225	1537	1705	2065	2257
31	10	155	245	407	533	731	893	1127	1325	1595	1829	2135	2405
35	11	175	259	451	559	799	931	1219	1375	1711	1891	2275	2479
37	12	185	287	473	611	833	1007	1265	1475	1769	2015	2345	2627
41	13	205	301	517	637	901	1045	1357	1525	1885	2077	2485	2701
43	14	215	329	539	689	935	1121	1403	1625	1943	2201	2555	2849
47	15	235	343	583	715	1003	1159	1495	1675	2059	2263	2695	2923
49	16	245	371	605	767	1037	1235	1541	1775	2117	2387	2765	3071
53	17	265	385	649	793	1105	1273	1633	1825	2233	2449	2905	3145
55	18	275	413	671	845	1139	1349	1679	1925	2291	2573	2975	3293
59	19	295	427	715	871	1207	1387	1771	1975	2407	2635	3115	3367
61	20	305	455	737	923	1241	1463	1817	2075	2465	2759	3185	3515
65	21	325	469	781	949	1309	1501	1909	2125	2581	2821	3325	3589
67	22	335	497	803	1001	1343	1577	1955	2225	2639	2945	3395	3737
71	23	355	511	847	1027	1411	1615	2047	2275	2755	3007	3535	3811
73	24	365	539	869	1079	1445	1691	2093	2375	2813	3131	3605	3959
77	25	385	553	913	1105	1513	1729	2185	2425	2929	3193	3745	4033
79	26	395	581	935	1157	1547	1805	2231	2525	2987	3317	3815	4181
83	27	415	595	979	1183	1615	1843	2323	2575	3103	3379	3955	4255
85	28	425	623	1001	1235	1649	1919	2369	2675	3161	3503	4025	4403
89	29	445	637	1045	1261	1717	1957	2461	2725	3277	3565	4165	4477
91	30	455	665	1067	1313	1751	2033	2507	2825	3335	3689	4235	4625
95	31	475	679	1111	1339	1819	2071	2599	2875	3451	3751	4375	4699
97	32	485	707	1133	1391	1853	2147	2645	2975	3509	3875	4445	4847
101	33	505	721	1177	1417	1921	2185	2737	3025	3625	3937	4585	4921
103	34	515	749	1199	1469	1955	2261	2783	3125	3683	4061	4655	5069
107	35	535	763	1243	1495	2023	2299	2875	3175	3799	4123	4795	5143
109	36	545	791	1265	1547	2057	2375	2921	3275	3857	4247	4865	5291
113	37	565	805	1309	1573	2125	2413	3013	3325	3973	4309	5005	5365
115	38	575	833	1331	1625	2159	2489	3059	3425	4031	4433	5075	5513
119	39	595	847	1375	1651	2227	2527	3151	3475	4147	4495	5215	5587
121	40	605	875	1397	1703	2261	2603	3197	3575	4205	4619	5285	5735
125	41	625	889	1441	1729	2329	2641	3289	3625	4321	4681	5425	5809
127	42	635	917	1463	1781	2363	2717	3335	3725	4379	4805	5495	5957
131	43	655	931	1507	1807	2431	2755	3427	3775	4495	4867	5635	6031
133	44	665	959	1529	1859	2465	2831	3473	3875	4553	4991	5705	6179
137	45	685	973	1573	1885	2533	2869	3565	3925	4669	5053	5845	6253
139	46	695	1001	1595	1937	2567	2945	3611	4025	4727	5177	5915	6401
143	47	715	1015	1639	1963	2635	2983	3703	4075	4843	5239	6055	6475
145	48	725	1043	1661	2015	2669	3059	3749	4175	4901	5363	6125	6623
149	49	745	1057	1705	2041	2737	3097	3841	4225	5017	5425	6265	6697
151	50	755	1085	1727	2093	2771	3173	3887	4325	5075	5549	6335	6845
155	51	775	1099	1771	2119	2839	3211	3979	4375	5191	5611	6475	6919
157	52	785	1127	1793	2171	2873	3287	4025	4475	5249	5735	6545	7067
161	53	805	1141	1837	2197	2941	3325	4117	4525	5365	5797	6685	7141
163	54	815	1169	1859	2249	2975	3401	4163	4625	5423	5921	6755	7289
167	55	835	1183	1903	2275	3043	3439	4255	4675	5539	5983	6895	7363
169	56	845	1211	1925	2327	3077	3515	4301	4775	5597	6107	6965	7511
173	57	865	1225	1969	2353	3145	3553	4393	4825	5713	6169	7105	7585
175	58	875	1253	1991	2405	3179	3629	4439	4925	5771	6293	7175	7733
179	59	895	1267	2035	2431	3247	3667	4531	4975	5887	6355	7315	7807
181	60	905	1295	2057	2483	3281	3743	4577	5075	5945	6479	7385	7955
185	61	925	1309	2101	2509	3349	3781	4669	5125	6061	6541	7525	8029
187	62	935	1337	2123	2561	3383	3857	4715	5225	6119	6665	7595	8177
191	63	955	1351	2167	2587	3451	3895	4807	5275	6235	6727	7735	8251
193	64	965	1379	2189	2639	3485	3971	4853	5375	6293	6851	7805	8399
197	65	985	1393	2233	2665	3553	4009	4945	5425	6409	6913	7945	8473
199	66	995	1421	2255	2717	3587	4085	4991	5525	6467	7037	8015	8621
203	67	1015	1435	2299	2743	3655	4123	5083	5575	6583	7099	8155	8695
205	68	1025	1463	2321	2795	3689	4199	5129	5675	6641	7223	8225	8843
209	69	1045	1477	2365	2821	3757	4237	5221	5725	6757	7285	8365	8917
211	70	1055	1505	2387	2873	3791	4313	5267	5825	6815	7409	8435	9065
215	71	1075	1519	2431	2899	3859	4351	5359	5875	6931	7471	8575	9139
217	72	1085	1547	2453	2951	3893	4427	5405	5975	6989	7595	8645	9287
221	73	1105	1561	2497	2977	3961	4465	5497	6025	7105	7657	8785	9361
223	74	1115	1589	2519	3029	3995	4541	5543	6125	7163	7781	8855	9509
227	75	1135	1603	2563	3055	4063	4579	5635	6175	7279	7843	8995	9583
229	76	1145	1631	2585	3107	4097	4655	5681	6275	7337	7967	9065	9731
233	77	1165	1645	2629	3133	4165	4693	5773	6325	7453	8029	9205	9805
235	78	1175	1673	2651	3185	4199	4769	5819	6425	7511	8153	9275	9953
239	79	1195	1687	2695	3211	4267	4807	5911	6475	7627	8215	9415	10027
241	80	1205	1715	2717	3263	4301	4883	5957	6575	7685	8339	9485	10175
245	81	1225	1729	2761	3289	4369	4921	6049	6625	7801	8401	9625	10249
247	82	1235	1757	2783	3341	4403	4997	6095	6725	7859	8525	9695	10397
251	83	1255	1771	2827	3367	4471	5035	6187	6775	7975	8587	9835	10471
253	84	1265	1799	2849	3419	4505	5111	6233	6875	8033	8711	9905	0
257	85	1285	1813	2893	3445	4573	5149	6325	6925	8149	8773	0	0
259	86	1295	1841	2915	3497	4607	5225	6371	7025	8207	0	0	0
263	87	1315	1855	2959	3523	4675	5263	6463	7075	0	0	0	0
265	88	1325	1883	2981	3575	4709	5339	6509	0	0	0	0	0
269	89	1345	1897	3025	3601	4777	5377	0	0	0	0	0	0
271	90	1355	1925	3047	3653	4811	0	0	0	0	0	0	0
275	91	1375	1939	3091	3679	0	0	0	0	0	0	0	0
277	92	1385	1967	3113	0	0	0	0	0	0	0	0	0
281	93	1405	1981	0	0	0	0	0	0	0	0	0	0

Fig.7. Tabular summary *of numbers* u_r *smaller than the number* x.

- the numbers 0 seen at the bottom of the table are caused by the offsets of the rows of subsequent columns in accordance with the illustration of the idea of tabular summary of number u_r (Fig. 6.);
- comparing two figures 5 and 7, we come to the conclusion that among the generated numbers u_r in the range $(0, x >$ there are still repeating values.

STEP 4.

Determination of the multiplicity of repetitions of the numbers u_r in the interval $(0, x >$;

- using very useful formulas of the EXCEL program we are able to count the duplication times (repetitions) of individual values of the number u_r (see. Fig. 9.);
- result:

ILOŚĆ	WKR	Zr
206	1	206
48	2	24
54	3	18
4	4	1
0	5	0
0	6	0
0	7	0
0	8	0
0	9	0
312	Ur	249

Fig.8. The multiplicity of the repetitions of generated u_r numbers (results).

- according to the table in Fig. 8. and the postulate No 2 from the numbers z_r falling within the range $(0, \frac{x}{5} >$ we are able to generate in the numerical range $(0, x >$ up to 312 numbers u_r, with the proviso that:
    - 48 numbers u_r are repeated twice;
    - 54 numbers u_r are repeated three times;
    - 4 numbers u_r r are repeated four times;
- if the number of repeated numbers of each group divide by their multiplicity, we will get an interesting set of numbers u_r;
- finally we receive information that the number of generated and different numbers u_r (i.e. without repetitions) in the range $(0, x >$ is exactly 249;

STEP 5.

Calculation of the power of a set of prime numbers, which at this moment becomes the proverbial "bread roll", because it is enough to determine which number according to the formula (9) is the number x and subtract from it the number 249 received above (see formula 12);

		1	2	3	4	5	6	7	8	9	10	11	12
5	1	1	1	1	1	1	1	1	2	1	1	4	1
7	2	1	1	1	1	1	1	2	2	1	3	3	
11	3	1	1	1	1	1	2	1	2	3	1		
13	4	1	1	1	1	2	1	1	3	1	1		
17	5	1	1	1	2	1	1	3	2	1	1		
19	6	1	1	2	1	1	3	1	2	1			
23	7	1	2	1	1	3	1	1	2	1			
25	8	1	1	1	3	1	1	1	2				
29	9	1	1	3	1	1	1	1	4				
31	10	1	2	1	1	1	1	2	2				
35	11	2	1	1	1	1	2	1	3				
37	12	1	1	1	1	2	1	3					
41	13	1	1	1	2	1	3	1					
43	14	1	1	2	1	3	1	1					
47	15	1	1	1	3	1	1						
49	16	2	1	2	1	1	3						
53	17	1	3	1	1	3	1						
55	18	2	1	1	2	1	1						
59	19	1	1	3	1	1	1						
61	20	1	3	1	1	1							
65	21	2	1	1	1	3							
67	22	1	1	1	3	1							
71	23	1	1	2	1	1							
73	24	1	2	1	1								
77	25	3	1	1	3								
79	26	1	1	3	1								
83	27	1	3	1	2								
85	28	2	1	3	3								
89	29	1	2	3	1								
91	30	3	3	1	1								
95	31	2	1	1	1								
97	32	1	1	1	1								
101	33	1	1	1									
103	34	1	1	1									
107	35	1	1	1									
109	36	1	1	3									
113	37	1	3	3									
115	38	2	2	1									
119	39	3	2	3									
121	40	2	3	1									
125	41	2	1										
127	42	1	1										
131	43	1	2										
133	44	3	1										
137	45	1	1										
139	46	1	3										
143	47	3	3										
145	48	2	1										
149	49	1	1										
151	50	1	3										
155	51	2	1										
157	52	1	2										
161	53	3	1										
163	54	1	1										
167	55	1	2										
169	56	2	1										
173	57	1	4										
175	58	3	1										
179	59	1	1										
181	60	1	3										
185	61	2	3										
187	62	3	1										
191	63	1	1										
193	64	1	1										
197	65	1	1										
199	66	1											
203	67	3											
205	68	2											
209	69	3											
211	70	1											
215	71	2											
217	72	3											
221	73	3											
223	74	1											
227	75	1											
229	76	1											
233	77	1											
235	78	2											
239	79	1											
241	80	1											
245	81	4											
247	82	3											
251	83	1											
253	84	3											
257	85	1											
259	86	3											
263	87	1											
265	88	2											
269	89	1											
271	90	1											
275	91	3											
277	92	1											
281	93	1											
283	94												

Fig.9. Multiplicity of duplicate values of numbers u_r less than x.

$$z_{r_k} = O_r + 6\sum_{1}^{k}(-1)^{k+1}k \qquad (9)$$

$$z_{r_k} = 1411$$

$$k = 470$$

- for those who still accept the number t_r for the proper prime numbers - add the number two to the result obtained:

$$Z_r - U_r + T_r = P_r \qquad (12)$$

$$470 - 249 + T_r = 211 + T_r$$

$$\pi(1411) = 211 + T_r$$

MATHEMATICAL CALCULATIONS:

REFERENCE TO STEP 2.

In order to resolve item 3 from example No. 1, the number of numbers z_r included in the set should be determined by using the formula $(0, \frac{x}{5} >$:

$$n(Z_{r_i}) = \left[\frac{x-5}{30}\right] + \left[\frac{x+5}{30}\right] \qquad (16)$$

— where:

- $n(Z_{r_i})$ — power of the set Z_{r_i};
- i — (auxiliary record)
  index informing about the number of z_r in the set $(0, \frac{x}{5} >$
  the value of the index is synonymous with the table height;
- [ ] — means the result trait (integer part) used for next activities;

The above result of the amount z_{r_i} is at the same time the height (indicates the number of rows) of the tabular summary of the number u_r (Fig.5.).

The width (number of columns) of the tabular summary of number u_r (Fig.5.) is able to be determined using a very similar formula:

$$n\left(Z_{r_j}\right) = \left[\frac{[\sqrt{x}]-1}{6}\right] + \left[\frac{[\sqrt{x}]+1}{6}\right] \quad (17)$$

— where:

- $n\left(Z_{r_j}\right)$ — power of the set Z_{r_j};
- j — (auxiliary record)
  index informing about the number of z_r in the set $(0, \sqrt{x} >$,
  the value of the index is synonymous with the table width;
- [ ] — means the result trait (integer part) used for next activities;

EXAMPLE 2:

Table's height:

1) Let x be 1411.
2) If we set 1411 under the formula 16 we get **93** – *number of numbers* z_{r_i} = *number of rows.*
3) If the numbers from 1 to 93 are substituted by the formula (9), then we obtain the values of all numbers z_{r_i} of the set $(0{,}282{,}2 >$, where the largest is $z_{r_{93}} = 281$.

Table's width:

1) If we set 1411 under the formula 17 we get **12** – *number of numbers* z_{r_j} = *numer of columns.*
2) If the numbers from 1 to 12 are substituted by the formula (9), then we obtain the values of all numbers z_{r_j} of the set $(0; 37{,}56 >$, where the largest is $z_{r_{12}} = 37$.

REFERENCE TO STEP 3.

The formula for calculating the total number of numbers u_r being a numerical combination (Fig. 7.) smaller than the numer x is a combination of three formulas: 9, 16 i 17:

$$n(U_{r_k}) = \sum_{j=1}^{n\left(z_{r_j}\right)} \left[\frac{x-\left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + \left[\frac{x+\left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] - (j-1) \quad (18)$$

— gdzie:

- $n\left(U_{r_k}\right)$ — power of the set U_{r_k};
- $n\left(Z_{r_j}\right)$ — power of the set Z_{r_j} according to formula 17.
- [ ] — means the result trait (integer part) used for next activities;

- z_{r_j} — individual numbers z_r with the index above interval j;
- j — ordinal number of the number z_{r_j} $(j \in C)$;

<u>REFERENCE TO STEP 4.</u>

Dispose of the multiplicity of repetitions of the numbers u_r constituting the numerical combination (Fig. 7.). For this purpose, we can use the following general formula of the set U_r consisting of the value of the function $f\left(z_{r_j} z_{r_i}\right)$:

$$U_r \leftrightarrow f\left(z_{r_j} z_{r_i}\right) \tag{19}$$

$$\bigwedge_{z_{r_j}} j \in < 1; n\left(Z_{r_j}\right) > \bigwedge_{z_{r_i}} i \in < j; \left[\frac{x - \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + \left[\frac{x + \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + (j-1) > \rightarrow f\left(z_{r_j} z_{r_i}\right) \tag{20}$$

$$where\ f\left(z_{r_j} z_{r_i}\right) = z_{r_j} z_{r_i} \tag{21}$$

— gdzie:

- U_r — a set consisting of unique values of the number u_r;
- i — ordinal number of the number z_{r_i}, where $i \in < j; \left[\frac{x - \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + \left[\frac{x + \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + (j-1) > \wedge\ i \in$ C;
- j — ordinal number of the number z_{r_j}, where $j \in < 1; n\left(Z_{r_j}\right) > \wedge\ j \in$ C;

In this way, we get all the data (values) necessary to calculate the power of prime numbers using the formula 12 - which has its confirmation in the work of the mathematical calculator (EXCEL).

2. VERIFICATION OF THE "PRIME" NUMBER z_r

The proverbial "icing on the cake" would be the solution to the problem of verifying the number z_r in terms of its primacy, i.e. whether it is the prime number or the imaginary prime number.

I believe that it is logically possible if we follow the algorithm below - if we compare the cell values of the highest rows of all the columns of the table summary of numbers u_r with the number x being the right boundary of the whole set of integers numbers:

$$\bigwedge_{z_{r_j}} j \in <1; n\left(Z_{r_j}\right) > \bigvee_{z_{r_i}} i = \left[\frac{x - \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + \left[\frac{x + \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + (j-1) \rightarrow f\left(z_{r_j} z_{r_i}\right) \qquad (22)$$

$$f\left(z_{r_j} z_{r_i}\right) = z_{r_j} z_{r_i} \qquad (23)$$

— where:
- i — ordinal number of the number z_{r_i};
- j — ordinal number of the number z_{r_j} ($j \in C$);

— if:
- $f\left(z_{r_j}, z_{r_i}\right) < x$ — number z_r is the proper prime number p_r;
- $f\left(z_{r_j}, z_{r_i}\right) = x$ — number z_r is the improper prime number u_r;

The number of comparisons made in accordance with the above algorithm equals only the harvesting power $n\left(Z_{r_j}\right)$, and its display shows blue ellipses on the table summary of numbers u_r (Fig. 5.)

PREPARED

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