#### 237

#### 35 ST. ANDREW SQUARE, EDINBURGH, 31st January 1936.

The Honorary Editor,

#### THE FACULTY OF ACTUARIES IN SCOTLAND, EDINBURGH.

DEAR SIR,

#### A1924-29 ULTIMATE TABLES $2\frac{1}{2}$ % INTEREST.

Having recently had occasion to use the Joint Life Annuity Values on this basis, given in the published Tables, I found it tedious to interpolate for the intermediate Values by inspection as suggested by the Joint Committee, and realising that interpolation by first differences gave rise roughly to an error of  $\cdot 01$  in the Values, I formed a complete Table for all ages from 21 to 90, using second forward differences in the interpolation. These Tables I now enclose with the hope that others may be saved the trouble of repeating the work.

Having drafted the form of the Tables and inserted the Values where each age was a multiple of three and where the ages were equal, interpolation was carried out for the older ages keeping the younger ages constant, the work being checked at each stage by summation. Thereafter in each perpendicular column interpolation was made for the younger age, and this work was not checked by summation, but, having based  $u_{3x+1}$  and  $u_{3x+2}$  on  $u_{3x}$  and its first and second differences, these were checked by ascertaining that  $u_{3(x+1)} - u_{3x+2} = \frac{1}{3} \Delta u_{3x} + \frac{1}{9} \Delta^2 u_{3x}$ . In all the interpolations where at the end of each column the second difference adjustment was not available, it was found by extrapolation from the preceding Values.

As the published Values are given to three decimal places, as are the interpolated Values, the latter are, of course, suspect to the extent of  $\cdot 001$ .

I am, Sir,

Yours faithfully,

C. KEITH GRANGER.

VOL. XV.

## A1924–29 ultimate

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				y			
x	21	22	23	24	25	26	27
21	24.277	24.137	23.986	23.825	23.653	23.470	23.276
		24.002	23.858	23.703	23.537	23.359	23.171
	21		23.718	23.570	23.410	$23 \cdot 238$	23.056
		22	93	$23 \cdot 425$	$23 \cdot 272$	23.107	22.931
			~0	24	23.124	22.966	22.797
					<u> </u>	22.814	$22 \cdot 652$
					25	00	$22 \cdot 495$
	l					26	27
	90	ĺ					
90	1.075						
	- •••		88				
89	1.119	1.165		87			
88	1.163	1.212	1.262		86		
87	1.207	1.260	1.313	1.366	1 470	85	
80 95	1.202	1.257	1.300	1.476	1.479	1.500	0/
00	1.791	1.991	1.411	1.410	1.091	1.988	07
84	1.342	1.405	1.468	1.531	1.596	1.662	1.729
83	1.387	1.453	1.520	1.588	1.656	1.725	1.797
82	1.432	1.501	1.572	1.644	1.716	1.789	1.865
81	1.477	1.549	1.623	1.698	1.775	1.853	1.933
80	1.521	1.596	1.674	1.752	1.834	1.917	2.002
79	1.565	1.643	1.725	1.807	1.893	1.980	2.070
78	1.608	1.690	1.775	1.862	1.952	2.044	2.138
77	1.650	1.736	1.824	1.914	2.008	2.106	2.205
76	1.690	1.780	1.872	1.966	2.064	2.166	2.270
75	1.729	1.823	1.919	2.017	2.119	2.225	2.334
74	1.766	1.865	1.964	2.065	2.172	2.281	2.397
73	1.802	1.904	2.007	2.112	$2 \cdot 223$	2.337	2.457
72	1.837	1.941	2.048	2.158	2.273	2.392	2.515
71	1.869	1.977	2.088	2.201	2.320	2.444	2.571
70	1.901	2.012	2.126	2.243	2.366	2.494	2.626
69	1.932	2.045	2.162	2.283	2.410	2.542	2.679
68	1.960	2.077	2.198	2.322	2.451	2.587	2.729
67	1.987	$2 \cdot 107$	$2 \cdot 231$	2.358	2.491	2.631	2.777
66	2.013	2.136	2.262	2.392	2.529	2.673	2.823
65	2.036	2.161	2.291	2.424	2.564	2.710	2.865
64	2.057	2.184	2.316	2.452	2.595	2.745	2.903
63	2.076	2.204	2.338	2.477	2.623	2.777	2.938
62	2.092	2.224	2.359	2.501	2.649	2.806	2.971
61	2.108	2.242	2.379	2.522	2.673	2.833	3.000
60	2.123	2.258	2.397	2.541	2.695	2.857	3.026
	90	89	88	87	86	85	84
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28	29	30	31	32	33	34	ü
23.070	$22 \cdot 853$	22.624	22.383	22.131	21.869	21.595	21
22.971	22.760	22.536	22.301	22.054	21.798	21.528	22
$22 \cdot 862$	22.657	22.439	22.210	21.968	21.718	21.453	23
22.744	22.545	22.333	22.109	21.874	21.628	21.370	24
22.616	22.423	$22 \cdot 218$	22.001	21.771	21.532	21.280	25
$22 \cdot 477$	$22 \cdot 290$	22.092	21.882	21.658	21.426	21.180	26
$22 \cdot 327$	22.147	21.956	21.752	21.536	21.309	21.069	27
$22 \cdot 166$	21.993	21.808	21.612	21.401	21.183	20.950	28
28	21.828	21.649	21.461	21.256	21.046	20.820	29
	29	21.480	21.298	21.104	20.899	20.680	30
			21.124	20.938	20.739	20.528	31
		30	I	20.759	20.568	20.365	32
			31		20.386	20.191	33
				32	99	20.006	34
					00	34	
	,						
83		Ī					
1.869	82	81		•			
1.942	2.019		80				
2.015	2.097	2.180					
2.089	2.177	2.265	9.252	70			
			2'000	19	mo		
9.169	9.955	9.940	9.449		78		
2.162	2.255	2.349	2·333	2.538	78	77	
2.162 2.234	$2 \cdot 255$ $2 \cdot 332$	2.349 2.432	2·333 2·443 2·533	2.538 2.634	<b>78</b>	77	-
2.162 2.234 2.305	$2 \cdot 255$ $2 \cdot 332$ $2 \cdot 409$	2.349 2.432 2.514	2.443 2.533 2.622 2.622	2·538 2·634 2·729	78 2·736 2·841	77 2.946	77
$2 \cdot 162$ $2 \cdot 234$ $2 \cdot 305$ $2 \cdot 376$	$2 \cdot 255$ $2 \cdot 332$ $2 \cdot 409$ $2 \cdot 485$	$2 \cdot 349$ $2 \cdot 432$ $2 \cdot 514$ $2 \cdot 596$	$ \begin{array}{c} 2 \cdot 333 \\ 2 \cdot 443 \\ 2 \cdot 533 \\ 2 \cdot 622 \\ 2 \cdot 709 \\ 2 \cdot 709 \\ \end{array} $	2.538 2.634 2.729 2.823	<b>78</b> 2.736 2.841 2.941	77 2.946 3.054	77 76
$\begin{array}{c} 2 \cdot 162 \\ 2 \cdot 234 \\ 2 \cdot 305 \\ 2 \cdot 376 \\ 2 \cdot 446 \end{array}$	$2 \cdot 255 \\ 2 \cdot 332 \\ 2 \cdot 409 \\ 2 \cdot 485 \\ 2 \cdot 560$	$ \begin{array}{r} 2 \cdot 349 \\ 2 \cdot 432 \\ 2 \cdot 514 \\ 2 \cdot 596 \\ 2 \cdot 677 \\ \end{array} $	$ \begin{array}{r} 2 \cdot 333 \\ 2 \cdot 443 \\ 2 \cdot 533 \\ 2 \cdot 622 \\ 2 \cdot 709 \\ 2 \cdot 795 \\ \end{array} $	2.538 2.634 2.729 2.823 2.916	78 2·736 2·841 2·941 3·039	77 2·946 3·054 3·161	77 76 75
$\begin{array}{c} 2 \cdot 162 \\ 2 \cdot 234 \\ 2 \cdot 305 \\ 2 \cdot 376 \\ 2 \cdot 446 \\ 2 \cdot 514 \end{array}$	$2 \cdot 255 \\ 2 \cdot 332 \\ 2 \cdot 409 \\ 2 \cdot 485 \\ 2 \cdot 560 \\ 2 \cdot 633$	$ \begin{array}{r} 2 \cdot 349 \\ 2 \cdot 432 \\ 2 \cdot 514 \\ 2 \cdot 596 \\ 2 \cdot 677 \\ 2 \cdot 755 \\ \end{array} $	$   \begin{array}{r}     2 \cdot 333 \\     2 \cdot 443 \\     2 \cdot 533 \\     2 \cdot 622 \\     2 \cdot 709 \\     2 \cdot 795 \\     2 \cdot 879 \\   \end{array} $	2.538 2.634 2.729 2.823 2.916 3.007	78 2·736 2·841 2·941 3·039 3·136	77 2·946 3·054 3·161 3·268	77 76 75 74
$\begin{array}{c} 2 \cdot 162 \\ 2 \cdot 234 \\ 2 \cdot 305 \\ 2 \cdot 376 \\ 2 \cdot 446 \\ 2 \cdot 514 \\ 2 \cdot 579 \end{array}$	2·255 2·332 2·409 2·485 2·560 2·633 2·704	2·349 2·432 2·514 2·596 2·677 2·755 2·832	2·333 2·443 2·533 2·622 2·709 2·795 2·879 2·963	2.538 2.634 2.729 2.823 2.916 3.007 3.097	78 2.736 2.841 2.941 3.039 3.136 3.233	77 2·946 3·054 3·161 3·268 3·272	77 76 75 74 73
$\begin{array}{c} 2 \cdot 162 \\ 2 \cdot 234 \\ 2 \cdot 305 \\ 2 \cdot 376 \\ 2 \cdot 446 \\ 2 \cdot 514 \\ 2 \cdot 579 \\ 2 \cdot 642 \end{array}$	2·255 2·332 2·409 2·485 2·560 2·633 2·704 2·773	2·349 2·432 2·514 2·596 2·677 2·755 2·832 2·908	2-333 2-443 2-533 2-622 2-709 2-795 2-879 2-963 3-046	2.538 2.634 2.729 2.823 2.916 3.007 3.097 3.186	78 2·736 2·841 2·941 3·039 3·136 3·233 3·329	77 2-946 3-054 3-161 3-268 3-272 3-473	77 76 75 74 73 72
$\begin{array}{c} 2.162\\ 2.234\\ 2.305\\ 2.376\\ 2.446\\ 2.514\\ 2.579\\ 2.642\\ 2.704\end{array}$	2.255 2.332 2.409 2.485 2.560 2.633 2.704 2.773 2.841	2·349 2·432 2·514 2·596 2·677 2·755 2·832 2·908 2·981	2·333 2·443 2·533 2·622 2·709 2·795 2·879 2·963 3·046 3·126	2.538 2.634 2.729 2.823 2.916 3.007 3.097 3.186 3.272	78 2·736 2·841 2·941 3·039 3·136 3·233 3·329 3·422	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574	77 76 75 74 73 72 71
$\begin{array}{c} 2\cdot 162\\ 2\cdot 234\\ 2\cdot 305\\ 2\cdot 376\\ 2\cdot 446\\ 2\cdot 514\\ 2\cdot 579\\ 2\cdot 642\\ 2\cdot 704\\ 2\cdot 764\end{array}$	2.255 2.332 2.409 2.485 2.560 2.633 2.704 2.773 2.841 2.906	2·349 2·432 2·514 2·596 2·677 2·755 2·832 2·908 2·981 3·052	2·333 2·443 2·533 2·622 2·709 2·795 2·879 2·963 3·046 3·126 3·203	2.538 2.634 2.729 2.823 2.916 3.007 3.097 3.186 3.272 3.356	<b>78</b> 2.736 2.841 3.039 3.136 3.233 3.329 3.422 3.513	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.672	77 76 75 74 73 72 71 70
2.162 2.234 2.305 2.376 2.446 2.514 2.579 2.642 2.704 2.764 2.822	2.255 2.332 2.409 2.485 2.560 2.633 2.704 2.773 2.841 2.906 2.969	2.349 2.432 2.514 2.596 2.677 2.755 2.832 2.908 2.981 3.052 3.121	2 333 2.443 2.533 2.622 2.709 2.795 2.879 2.963 3.046 3.126 3.203 3.2278	2.538 2.634 2.729 2.823 2.916 3.007 3.097 3.186 3.272 3.356 3.438	78 2.736 2.841 2.941 3.039 3.136 3.233 3.329 3.422 3.513 3.602	77 2-946 3-054 3-161 3-268 3-272 3-473 3-574 3-672 3-768	77 76 75 74 73 72 71 70 69
$\begin{array}{c} 2\cdot 162\\ 2\cdot 234\\ 2\cdot 305\\ 2\cdot 376\\ 2\cdot 446\\ 2\cdot 514\\ 2\cdot 579\\ 2\cdot 642\\ 2\cdot 704\\ 2\cdot 764\\ 2\cdot 822\\ 2\cdot 876\end{array}$	2.255 2.332 2.409 2.485 2.560 2.633 2.704 2.773 2.841 2.906 2.969 3.029	2·349 2·432 2·514 2·596 2·677 2·755 2·832 2·908 2·981 3·052 3·121 3·187	2·333 2·443 2·533 2·622 2·709 2·795 2·879 2·963 3·046 3·126 3·203 3·278 3·278	2·538 2·634 2·729 2·823 2·916 3·007 3·186 3·272 3·356 3·438 3·516	78 2.736 2.841 2.941 3.039 3.136 3.233 3.329 3.422 3.513 3.602 3.687	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.672 3.768 3.860	77 76 75 74 73 72 71 70 69 68
$2 \cdot 162$ $2 \cdot 234$ $2 \cdot 305$ $2 \cdot 376$ $2 \cdot 446$ $2 \cdot 514$ $2 \cdot 579$ $2 \cdot 642$ $2 \cdot 704$ $2 \cdot 764$ $2 \cdot 822$ $2 \cdot 822$ $2 \cdot 876$ $2 \cdot 929$	2.255 2.332 2.409 2.485 2.560 2.633 2.704 2.704 2.773 2.841 2.906 2.969 3.029 3.029	2·349 2·432 2·514 2·596 2·677 2·755 2·832 2·908 2·981 3·052 3·121 3·187 3·250	2·333 2·443 2·533 2·622 2·709 2·795 2·879 2·963 3·046 3·126 3·203 3·278 3·349 3·418	2.538 2.634 2.729 2.823 2.916 3.007 3.097 3.186 3.272 3.356 3.438 3.516 3.591	78 2.736 2.841 2.941 3.039 3.136 3.233 3.329 3.422 3.513 3.602 3.687 3.769	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.574 3.672 3.768 3.860 3.949	77 76 75 74 73 72 71 70 69 68 67
2.162 2.234 2.305 2.376 2.446 2.514 2.579 2.642 2.704 2.764 2.822 2.876 2.929 2.980	2.255 2.332 2.409 2.485 2.560 2.633 2.704 2.773 2.841 2.906 2.969 3.029 3.087 3.142	2.349 2.432 2.514 2.596 2.677 2.755 2.832 2.908 2.981 3.052 3.121 3.187 3.250 3.310	2·333 2·443 2·533 2·622 2·709 2·795 2·879 2·963 3·046 3·126 3·203 3·278 3·278 3·278 3·349 3·418 3·484	2.538 2.634 2.729 2.823 2.916 3.007 3.097 3.186 3.272 3.356 3.438 3.516 3.591 3.663	78 2.736 2.841 3.039 3.136 3.233 3.329 3.422 3.513 3.602 3.687 3.769 3.848	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.672 3.768 3.860 3.949 4.035	77 76 75 74 73 72 71 70 69 68 67 66
$2 \cdot 162$ $2 \cdot 234$ $2 \cdot 305$ $2 \cdot 376$ $2 \cdot 446$ $2 \cdot 514$ $2 \cdot 579$ $2 \cdot 642$ $2 \cdot 764$ $2 \cdot 764$ $2 \cdot 822$ $2 \cdot 876$ $2 \cdot 929$ $2 \cdot 980$ $3 \cdot 026$	$\begin{array}{c} 2\cdot 255\\ 2\cdot 332\\ 2\cdot 409\\ 2\cdot 485\\ 2\cdot 560\\ \hline\\ 2\cdot 633\\ 2\cdot 704\\ 2\cdot 704\\ 2\cdot 773\\ 2\cdot 841\\ 2\cdot 906\\ \hline\\ 2\cdot 969\\ 3\cdot 029\\ 3\cdot 087\\ 3\cdot 142\\ 3\cdot 192\\ \end{array}$	2·349 2·432 2·514 2·596 2·677 2·755 2·832 2·908 2·981 3·052 3·121 3·187 3·250 3·310 3·366	$2 \cdot 303$ $2 \cdot 443$ $2 \cdot 533$ $2 \cdot 622$ $2 \cdot 709$ $2 \cdot 795$ $2 \cdot 879$ $2 \cdot 963$ $3 \cdot 046$ $3 \cdot 126$ $3 \cdot 203$ $3 \cdot 278$ $3 \cdot 349$ $3 \cdot 418$ $3 \cdot 484$ $3 \cdot 544$	2.538 2.634 2.729 2.823 2.916 3.007 3.097 3.186 3.272 3.356 3.438 3.516 3.591 3.663 3.730	78 2.736 2.841 3.039 3.136 3.233 3.329 3.422 3.513 3.602 3.687 3.769 3.848 3.922	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.574 3.574 3.672 3.768 3.860 3.949 4.035 4.115	77 76 75 74 73 72 71 70 69 68 67 66 65
2.162 2.234 2.305 2.376 2.446 2.514 2.579 2.642 2.704 2.764 2.822 2.876 2.929 2.980 3.026 3.068	2.255 2.332 2.409 2.485 2.560 2.633 2.704 2.773 2.841 2.906 2.969 3.029 3.029 3.087 3.142 3.192 3.239	2·349 2·432 2·514 2·596 2·677 2·755 2·832 2·908 2·981 3·052 3·121 3·187 3·250 3·310 3·366 3·417	$\begin{array}{c} 2.333\\ 2.443\\ 2.533\\ 2.622\\ 2.709\\ 2.795\\ 2.879\\ 2.963\\ 3.046\\ 3.126\\ 3.203\\ 3.278\\ 3.349\\ 3.418\\ 3.349\\ 3.484\\ 3.544\\ 3.544\\ 3.601\\ \end{array}$	2·538 2·634 2·729 2·823 2·916 3·007 3·186 3·272 3·356 3·438 3·516 3·591 3·663 3·730 3·792	78 2.736 2.841 2.941 3.039 3.136 3.233 3.329 3.422 3.513 3.602 3.687 3.769 3.848 3.922 3.990	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.574 3.672 3.768 3.860 3.949 4.035 4.115 4.190	777 766 75 74 733 722 711 70 69 688 677 666 65 64
2.162 2.234 2.305 2.376 2.446 2.514 2.579 2.642 2.764 2.764 2.822 2.876 2.929 2.980 3.026 3.068 3.107	$\begin{array}{c} 2\cdot255\\ 2\cdot332\\ 2\cdot409\\ 2\cdot485\\ 2\cdot560\\ \hline\\ 2\cdot633\\ 2\cdot704\\ 2\cdot704\\ 2\cdot773\\ 2\cdot841\\ 2\cdot906\\ \hline\\ 2\cdot969\\ 3\cdot029\\ 3\cdot087\\ 3\cdot142\\ 3\cdot192\\ \hline\\ 3\cdot239\\ 3\cdot282\end{array}$	$\begin{array}{c} 2\cdot 349\\ 2\cdot 432\\ 2\cdot 514\\ 2\cdot 596\\ 2\cdot 677\\ 2\cdot 755\\ 2\cdot 832\\ 2\cdot 908\\ 2\cdot 981\\ 3\cdot 052\\ 3\cdot 121\\ 3\cdot 187\\ 3\cdot 250\\ 3\cdot 310\\ 3\cdot 366\\ 3\cdot 417\\ 3\cdot 464\end{array}$	$\begin{array}{c} 2.333\\ 2.443\\ 2.533\\ 2.622\\ 2.709\\ 2.795\\ 2.879\\ 2.963\\ 3.046\\ 3.126\\ 3.203\\ 3.278\\ 3.349\\ 3.418\\ 3.484\\ 3.544\\ 3.544\\ 3.601\\ 3.601\\ 3.654\end{array}$	2.538 2.634 2.729 2.823 2.916 3.007 3.097 3.097 3.186 3.272 3.356 3.438 3.516 3.551 3.663 3.730 3.792 3.850	78 2.736 2.841 3.039 3.136 3.233 3.329 3.422 3.513 3.602 3.687 3.769 3.848 3.922 3.990 4.053	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.574 3.672 3.768 3.860 3.949 4.035 4.115 4.190 4.260	77 76 75 74 73 72 71 70 69 68 67 66 65 64 63
2.162 2.234 2.305 2.376 2.446 2.514 2.579 2.642 2.704 2.764 2.822 2.876 2.929 2.980 3.026 3.068 3.107 3.142	$\begin{array}{c} 2\cdot255\\ 2\cdot332\\ 2\cdot409\\ 2\cdot485\\ 2\cdot560\\ \hline\\ 2\cdot633\\ 2\cdot704\\ 2\cdot773\\ 2\cdot841\\ 2\cdot906\\ \hline\\ 2\cdot969\\ 3\cdot029\\ 3\cdot087\\ 3\cdot142\\ 3\cdot192\\ \hline\\ 3\cdot239\\ 3\cdot239\\ 3\cdot282\\ 3\cdot322\end{array}$	$\begin{array}{c} 2.349\\ 2.432\\ 2.514\\ 2.596\\ 2.677\\ 2.755\\ 2.832\\ 2.908\\ 2.981\\ 3.052\\ 3.121\\ 3.187\\ 3.250\\ 3.310\\ 3.366\\ 3.417\\ 3.464\\ 3.506\end{array}$	$\begin{array}{c} 2.333\\ 2.443\\ 2.533\\ 2.622\\ 2.709\\ 2.795\\ 2.879\\ 2.963\\ 3.046\\ 3.126\\ 3.203\\ 3.278\\ 3.349\\ 3.418\\ 3.544\\ 3.544\\ 3.544\\ 3.601\\ 3.654\\ 3.654\\ 3.703\\ \end{array}$	2·538 2·634 2·729 2·823 2·916 3·007 3·097 3·186 3·272 3·356 3·438 3·516 3·591 3·663 3·730 3·792 3·850 3·903	78 2.736 2.841 3.039 3.136 3.233 3.329 3.422 3.513 3.602 3.687 3.769 3.848 3.922 3.990 4.053 4.112	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.672 3.768 3.949 4.035 4.115 4.190 4.260 4.325	77 76 75 74 73 72 71 70 69 68 66 65 66 65 64 63 62
2.162 2.234 2.305 2.376 2.446 2.514 2.579 2.642 2.704 2.764 2.822 2.876 2.929 2.980 3.026 3.026 3.068 3.107 3.142 3.175	$\begin{array}{c} 2\cdot255\\ 2\cdot332\\ 2\cdot409\\ 2\cdot485\\ 2\cdot560\\ \hline\\ 2\cdot633\\ 2\cdot704\\ 2\cdot773\\ 2\cdot841\\ 2\cdot906\\ \hline\\ 2\cdot969\\ 3\cdot029\\ 3\cdot322\\ 3\cdot358\\ \end{array}$	$\begin{array}{c} 2\cdot349\\ 2\cdot349\\ 2\cdot432\\ 2\cdot514\\ 2\cdot596\\ 2\cdot677\\ 2\cdot755\\ 2\cdot832\\ 2\cdot908\\ 2\cdot981\\ 3\cdot052\\ 3\cdot121\\ 3\cdot187\\ 3\cdot250\\ 3\cdot310\\ 3\cdot366\\ 3\cdot3417\\ 3\cdot464\\ 3\cdot506\\ 3\cdot546\end{array}$	$2 \cdot 303$ $2 \cdot 443$ $2 \cdot 533$ $2 \cdot 622$ $2 \cdot 709$ $2 \cdot 795$ $2 \cdot 879$ $2 \cdot 963$ $3 \cdot 046$ $3 \cdot 126$ $3 \cdot 203$ $3 \cdot 278$ $3 \cdot 278$ $3 \cdot 349$ $3 \cdot 418$ $3 \cdot 544$ $3 \cdot 601$ $3 \cdot 654$ $3 \cdot 703$ $3 \cdot 747$	2·538 2·634 2·729 2·823 2·916 3·007 3·186 3·272 3·356 3·438 3·516 3·591 3·663 3·730 3·792 3·850 3·903 3·903	78 2.736 2.841 2.941 3.039 3.136 3.233 3.233 3.233 3.422 3.513 3.602 3.687 3.769 3.848 3.922 3.990 4.053 4.112 4.167	77 2.946 3.054 3.161 3.268 3.272 3.473 3.574 3.672 3.768 3.860 3.949 4.035 4.115 4.190 4.260 4.325 4.386	777 765 75 74 733 722 71 70 69 688 677 66 65 64 65 64 62 61
$2 \cdot 162$ $2 \cdot 234$ $2 \cdot 305$ $2 \cdot 376$ $2 \cdot 446$ $2 \cdot 514$ $2 \cdot 579$ $2 \cdot 642$ $2 \cdot 704$ $2 \cdot 764$ $2 \cdot 822$ $2 \cdot 876$ $2 \cdot 929$ $2 \cdot 980$ $3 \cdot 026$ $3 \cdot 068$ $3 \cdot 107$ $3 \cdot 142$ $3 \cdot 175$ $3 \cdot 205$	$\begin{array}{c} 2\cdot255\\ 2\cdot332\\ 2\cdot409\\ 2\cdot485\\ 2\cdot560\\ \hline\\ 2\cdot633\\ 2\cdot704\\ 2\cdot773\\ 2\cdot841\\ 2\cdot906\\ \hline\\ 2\cdot969\\ 3\cdot029\\ 3\cdot087\\ 3\cdot142\\ 3\cdot192\\ \hline\\ 3\cdot239\\ 3\cdot282\\ 3\cdot328\\ 2\cdot358\\ 3\cdot391\\ \hline\end{array}$	$\begin{array}{c} 2\cdot349\\ 2\cdot349\\ 2\cdot514\\ 2\cdot596\\ 2\cdot677\\ 2\cdot755\\ 2\cdot832\\ 2\cdot908\\ 2\cdot981\\ 3\cdot052\\ 3\cdot121\\ 3\cdot187\\ 3\cdot250\\ 3\cdot310\\ 3\cdot366\\ 3\cdot417\\ 3\cdot464\\ 3\cdot506\\ 3\cdot546\\ 3\cdot546\\ 3\cdot585\end{array}$	$2 \cdot 303$ $2 \cdot 443$ $2 \cdot 533$ $2 \cdot 622$ $2 \cdot 709$ $2 \cdot 795$ $2 \cdot 879$ $2 \cdot 963$ $3 \cdot 046$ $3 \cdot 126$ $3 \cdot 203$ $3 \cdot 278$ $3 \cdot 349$ $3 \cdot 418$ $3 \cdot 418$ $3 \cdot 544$ $3 \cdot 601$ $3 \cdot 654$ $3 \cdot 703$ $3 \cdot 787$	2·538 2·634 2·729 2·823 2·916 3·007 3·097 3·186 3·272 3·356 3·438 3·516 3·591 3·663 3·730 3·792 3·850 3·903 3·952 3·998	78 2.736 2.841 3.039 3.136 3.233 3.329 3.422 3.513 3.602 3.687 3.769 3.848 3.922 3.990 4.053 4.112 4.167 4.217	$\begin{array}{c} \textbf{77} \\ \hline 2.946 \\ 3.054 \\ 3.161 \\ \hline 3.268 \\ 3.272 \\ 3.473 \\ 3.574 \\ 3.672 \\ \hline 3.768 \\ 3.949 \\ 4.035 \\ 4.035 \\ 4.115 \\ \hline 4.190 \\ 4.260 \\ 4.325 \\ 4.386 \\ 4.442 \end{array}$	77 76 75 72 71 70 69 68 67 66 65 64 63 62 61 60

VOL. XV.

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æ	35	36	37	38	39	40	41
21	21.311	21.016	20.711	20.397	20.075	19.743	19.402
22	21.249	20.959	20.657	20.348	20.029	19.701	19.364
23	21.179	20.894	20.596	20.292	19.977	19.653	19.320
24	21.101	20.821	20.529	20.228	19-919	19.600	19-271
25	21.016	20.742	20.456	20.161	19.856	19.542	19.216
26	20.922	20.654	20.374	20.085	19.785	19.476	19.154
27	20.818	20.557	20.283	19.999	19.706	19.401	19.086
28	20.706	20.452	20.185	19.907	19.620	19.321	19.012
29	20.583	20.436	20.076	19.805	19.524	19.232	18.929
30	20.450	20.210	19-957	19-693	19.419	19-133	18-836
31	20.307	20.073	19-828	19.571	19.305	19.026	18.736
39	20.152	19.925	19.688	19.439	19-180	18.909	18.626
33	19.985	19.767	19.537	19.296	19.045	18.782	18.507
34	19-808	19.598	19.377	19.143	18.900	18.644	18.378
01	10 000	10 000	10 011		10 000	10 011	10010
35	19.618	19.417	19.205	18.979	18.744	18.496	18.238
		19.224	19.020	18.804	18.576	18.338	18.088
	- 60 -	96	18.824	18.618	18.398	18.170	17.928
		30		18.419	18.208	17.990	17.757
			57	38	18.009	17.798	17.574
					39	17.594	17.381
						40	17.175
		T					41
1	76		T				
76	3.169	-75		-			
75	3.283	3.406	74		ī		
74	3.396	3.529	3.656	73	72		-
73	3.508	3.648	3.783	3.920		71	
72	3.618	3.765	3.909	4.054	4.199		70
71	3.726	3.981	4.035	4.188	4.342	4.493	
70	3.832	3.995	4·158	4.320	4.483	4.641	<b>4</b> ·803
69	3.936	4.107	4.278	4.440	4.621	4.791	4-961
68	4.036	4.216	4.394	4.574	4.756	4.037	5.117
67	4.133	4.321	4.508	4.697	4.888	5.079	5.269
RR	4.227	4.423	4.619	4.817	5.017	5.216	5.416
65	4.314	4.517	4.722	4.929	5.139	5.347	5.557
рл	4.306	4-807	4.810	5.035	5.954	5.479	5.609
69	4.479	4.692	4.011	5.135	5.369	5.501	5.991
80	4.544	4.771	4.007	5.230	5.464	5.709	5.049
02 01	4.611	4.944	5.079	5.919	5.569	5.202	6.0543
60	4.673	4.911	5.153	5.400	5.652	5.907	6.164
1	78	75	74	73	79	771	70
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## A1924-29 ultimate

		·	<del></del>				x
42	43	44	45	46	47	48	
19.052	18.693	18.325	17.947	17.560	17.166	16.765	21
19.018	18.661	18.296	17.921	17.536	17.145	16.746	22
18.978	18.624	18.262	17.890	17.508	17.120	16.723	23
18-932	18.582	18.223	17.855	17.477	17.091	16.696	24
18.882	18.537	18-181	17.817	17.442	17.059	16.667	24
18.825	18.485	18.133	17.773	17.401	17.022	16.633	26
18.762	18.426	18.080	17.723	17.355	16.979	16.594	27
18.692	18.362	18.021	17.668	17.304	16.932	16.552	28
18.614	18.290	17.954	17.606	17.247	16.879	16.504	29
18.528	18.209	17.879	17.537	17.183	16.820	16.449	30
18.435	18.121	17.797	17.462	17.114	16.757	16.390	31
18.332	18.024	17.707	17.378	17.037	16.686	16.324	32
18-219	17.919	17.608	17.286	16.951	16.606	16.250	32
18-097	17.805	17.502	17.186	16.859	16.520	16.170	34
17-965	17.681	17.386	17.079	16.758	16.426	16.082	35
17.824	17.548	17.260	16.960	16.647	16.323	15.987	36
17.673	17.404	17.125	16.834	16.529	16.212	$15 \cdot 885$	37
17.511	17.250	16.980	16.698	16.501	16.092	15.774	38
7.337	17.087	16.825	16.552	16.264	15.964	15.653	39
7.153	16.913	16.661	16.397	16-118	15.827	15.525	40
l6·957	16.727	16.485	16.230	15.961	15.679	15.386	41
l6·750	16.530	16.297	16.052	15.792	15.520	15.236	42
	16.321	16.097	15.863	15.613	15.350	15.076	43
42	43	15.886	15.661	15.421	15.168	14.904	44
	10	44	15.446	15.217	14.975	14.721	45
				15.000	14.769	14.524	46
			45	<u> </u>	14.550	14.315	47
				45	47	14.095	48
						<b>48</b>	
69	68		•				
5.130		67					
5.308	5.473		66	07			
5.470	5.647	5.831		65			
5.617	5.815	6.010	6.203				
5.769	5-978	6.183	6.388	6.586	64	63	
F 014	6.133	6.350	6.567	6.775	6.979		
0.814 I	6.281	6.510	6.739	6.957	7.171	7.380	63
6.053	6 499	6.661	6.903	7.131	7.359	7.580	62
5.914 6.053 6.183	0.420						
5.914 6.053 6.183 6.307	6.423 6.557	6.806	7.058	7.298	7.537	7.770	61
5.914 6.053 6.183 6.307 6.424	6.423 6.557 6.684	6·806 6·944	7·058 7·205	$7.298 \\ 7.457$	7·537 7·706	7·770 7·951	61 60

# 2<u>1</u>%

49 · 354 · 336 · 315 · 290 · 265 · 230 · 200 · 162 · 118 · 067 · 011 · 949 · 882 · 808	<b>50</b> <b>15</b> ·938 <b>15</b> ·922 <b>15</b> ·903 <b>15</b> ·857 <b>15</b> ·830 <b>15</b> ·799 <b>15</b> ·763 <b>15</b> ·722 <b>15</b> ·677 <b>15</b> ·629 <b>15</b> ·572 <b>15</b> ·506	<b>51</b> 15·517 15·503 15·486 15·467 15·446 15·421 15·391 15·359 15·322 15·279 15·233	<i>y</i> <b>52</b> <b>15</b> .088 <b>15</b> .076 <b>15</b> .061 <b>15</b> .043 <b>15</b> .023 <b>15</b> .023 <b>15</b> .000 <b>14</b> .973 <b>14</b> .943 <b>14</b> .909 <b>14</b> .871 <b>14</b> .820	<b>53</b> <b>14</b> ·655 <b>14</b> ·644 <b>14</b> ·631 <b>14</b> ·615 <b>14</b> ·597 <b>14</b> ·571 <b>14</b> ·524 <b>14</b> ·493 <b>14</b> ·458	<b>54</b> 14·219 14·209 14·197 14·182 14·166 14·147 14·126 14·101 14·073	<b>55</b> 13·776 13·767 13·756 13·743 13·729 13·712 13·693 13·671 13·645
<b>49</b> -354 -336 -315 -290 -265 -230 -162 -118 -067 -011 -949 -882 -808	<b>50</b> 15-938 15-922 15-903 15-880 15-857 15-830 15-799 15-763 15-722 15-677 15-629 15-572 15-506	<b>51</b> 15·517 15·503 15·486 15·467 15·446 15·421 15·391 15·359 15·322 15·279 15·233	<b>52</b> 15.088 15.076 15.061 15.023 15.023 15.000 14.973 14.943 14.909 14.871 14.820	<b>53</b> 14.655 14.644 14.631 14.615 14.597 14.576 14.551 14.524 14.493 14.458	<b>54</b> 14·219 14·209 14·197 14·182 14·166 14·147 14·126 14·101 14·073	55 13.776 13.767 13.756 13.743 13.729 13.712 13.693 13.671 13.645
·354 ·336 ·315 ·290 ·265 ·230 ·162 ·118 ·067 ·011 ·949 ·882 ·808	$\begin{array}{c} 15\cdot938\\ 15\cdot922\\ 15\cdot903\\ 15\cdot880\\ 15\cdot857\\ 15\cdot830\\ 15\cdot799\\ 15\cdot763\\ 15\cdot722\\ 15\cdot677\\ 15\cdot629\\ 15\cdot572\\ 15\cdot506\\ \end{array}$	$\begin{array}{c} 15{\cdot}517\\ 15{\cdot}503\\ 15{\cdot}486\\ 15{\cdot}467\\ 15{\cdot}446\\ 15{\cdot}421\\ 15{\cdot}391\\ 15{\cdot}359\\ 15{\cdot}322\\ 15{\cdot}279\\ 15{\cdot}233\\ 15{\cdot}279\\ 15{\cdot}233\\ \end{array}$	$\begin{array}{c} 15\cdot088\\ 15\cdot076\\ 15\cdot061\\ 15\cdot043\\ 15\cdot023\\ 15\cdot000\\ 14\cdot973\\ 14\cdot943\\ 14\cdot909\\ 14\cdot871\\ 14\cdot920\\ \end{array}$	$14.655 \\ 14.644 \\ 14.631 \\ 14.615 \\ 14.597 \\ 14.576 \\ 14.551 \\ 14.524 \\ 14.493 \\ 14.458 \\ 1$	$\begin{array}{c} 14\cdot 219\\ 14\cdot 209\\ 14\cdot 197\\ 14\cdot 182\\ 14\cdot 166\\ 14\cdot 147\\ 14\cdot 126\\ 14\cdot 101\\ 14\cdot 073\\ \end{array}$	13.776 13.767 13.756 13.758 13.729 13.729 13.712 13.693 13.671 13.645
-336 -315 -290 -265 -230 -200 -162 -118 -067 -011 -949 -882 -808	$\begin{array}{c} 15.922\\ 15.903\\ 15.850\\ 15.857\\ 15.830\\ 15.799\\ 15.763\\ 15.722\\ 15.677\\ 15.629\\ 15.572\\ 15.506 \end{array}$	$\begin{array}{c} 15{\cdot}503\\ 15{\cdot}486\\ 15{\cdot}467\\ 15{\cdot}446\\ 15{\cdot}421\\ 15{\cdot}391\\ 15{\cdot}359\\ 15{\cdot}322\\ 15{\cdot}322\\ 15{\cdot}279\\ 15{\cdot}233\\ 15{\cdot}233\\ \end{array}$	$15.076 \\ 15.061 \\ 15.023 \\ 15.023 \\ 15.000 \\ 14.973 \\ 14.943 \\ 14.909 \\ 14.871 \\ 14.920 \\ 14.920 \\ 1$	14.64414.63114.61514.59714.57614.55114.52114.42314.458	14.209 14.197 14.182 14.166 14.147 14.126 14.101 14.073	13.767 13.756 13.743 13.729 13.712 13.693 13.671 13.645
-315 -290 -265 -230 -200 -162 -118 -067 -011 -949 -882 -808	$\begin{array}{c} 15\cdot903\\ 15\cdot880\\ 15\cdot857\\ 15\cdot830\\ 15\cdot799\\ 15\cdot763\\ 15\cdot722\\ 15\cdot677\\ 15\cdot629\\ 15\cdot572\\ 15\cdot572\\ 15\cdot506\end{array}$	$\begin{array}{c} 15{\cdot}486\\ 15{\cdot}467\\ 15{\cdot}446\\ 15{\cdot}421\\ 15{\cdot}391\\ 15{\cdot}359\\ 15{\cdot}322\\ 15{\cdot}279\\ 15{\cdot}233\\ 15{\cdot}233\\ \end{array}$	$15.061 \\ 15.023 \\ 15.023 \\ 15.000 \\ 14.973 \\ 14.943 \\ 14.909 \\ 14.871 \\ 14.920 \\ 1$	14.631 14.597 14.576 14.551 14.524 14.493 14.458	14.197 14.182 14.166 14.147 14.126 14.101 14.073	13.756 13.743 13.729 13.712 13.693 13.671 13.645
-290 -265 -230 -200 -162 -118 -067 -011 -949 -882 -808	$\begin{array}{c} 15{\cdot}880\\ 15{\cdot}857\\ 15{\cdot}830\\ 15{\cdot}799\\ 15{\cdot}763\\ 15{\cdot}722\\ 15{\cdot}677\\ 15{\cdot}629\\ 15{\cdot}572\\ 15{\cdot}506\\ \end{array}$	15.467 $15.446$ $15.421$ $15.391$ $15.359$ $15.322$ $15.279$ $15.233$	15.043 15.023 15.000 14.973 14.943 14.909 14.871	14.615 $14.597$ $14.576$ $14.551$ $14.524$ $14.493$ $14.458$	14·182 14·166 14·147 14·126 14·101 14·073	13.743 13.729 13.712 13.693 13.671 13.645
-265 -230 -200 -162 -118 -067 -011 -949 -882 -808	$\begin{array}{c} 15.857\\ 15.830\\ 15.799\\ 15.763\\ 15.722\\ 15.677\\ 15.629\\ 15.572\\ 15.506\\ \end{array}$	$15.446 \\ 15.421 \\ 15.391 \\ 15.359 \\ 15.322 \\ 15.279 \\ 15.233 \\ 1$	15.023 15.000 14.973 14.943 14.909	$14.597 \\ 14.576 \\ 14.551 \\ 14.524 \\ 14.493 \\ 14.458 \\ 1$	$\begin{array}{c} 14 \cdot 166 \\ 14 \cdot 147 \\ 14 \cdot 126 \\ 14 \cdot 101 \\ 14 \cdot 073 \end{array}$	13.729 13.712 13.693 13.671 13.645
-230 -200 -162 -118 -067 -011 -949 -882 -808	$15 \cdot 830 \\ 15 \cdot 799 \\ 15 \cdot 763 \\ 15 \cdot 722 \\ 15 \cdot 677 \\ 15 \cdot 629 \\ 15 \cdot 572 \\ 15 \cdot 572 \\ 15 \cdot 506 \\ \end{array}$	$15 \cdot 421$ $15 \cdot 391$ $15 \cdot 359$ $15 \cdot 322$ $15 \cdot 279$ $15 \cdot 233$	$     \begin{array}{r}       15.000 \\       14.973 \\       14.943 \\       14.909 \\       14.871 \\       14.920 \\     \end{array} $	$\begin{array}{c c} 14{\cdot}576 \\ 14{\cdot}551 \\ 14{\cdot}524 \\ 14{\cdot}493 \\ 14{\cdot}493 \\ 14{\cdot}458 \end{array}$	14·147 14·126 14·101 14·073	13.712 13.693 13.671 13.645
-200 -162 -118 -067 -011 -949 -882 -808	$\begin{array}{c} 15 \cdot 799 \\ 15 \cdot 763 \\ 15 \cdot 722 \\ 15 \cdot 677 \\ 15 \cdot 629 \\ 15 \cdot 572 \\ 15 \cdot 576 \\ 15 \cdot 506 \end{array}$	$\begin{array}{c} 15 \cdot 391 \\ 15 \cdot 359 \\ 15 \cdot 322 \\ 15 \cdot 279 \\ 15 \cdot 233 \\ 15 \cdot 233 \end{array}$	14·973 14·943 14·909 14·871	14.55114.52414.49314.458	$\begin{array}{c} 14 \cdot 126 \\ 14 \cdot 101 \\ 14 \cdot 073 \end{array}$	13-693 13-671 13-645
-162 -118 -067 -011 -949 -882 -808	$15.763 \\ 15.722 \\ 15.677 \\ 15.629 \\ 15.572 \\ 15.506 \\$	$   \begin{array}{r}     15 \cdot 359 \\     15 \cdot 322 \\     15 \cdot 279 \\     15 \cdot 233 \\     15 \cdot 233 \\   \end{array} $	$     \begin{array}{r}       14 \cdot 943 \\       14 \cdot 909 \\       14 \cdot 871 \\       14 \cdot 820     \end{array} $	$\frac{14.524}{14.493}$	$14 \cdot 101 \\ 14 \cdot 073$	13.671 13.645
-118 -067 -011 -949 -882 -808	$   \begin{array}{r}     15 \cdot 722 \\     15 \cdot 677 \\     15 \cdot 629 \\     15 \cdot 572 \\     15 \cdot 506 \\   \end{array} $	$15 \cdot 322$ $15 \cdot 279$ $15 \cdot 233$	14·909 14·871	14·493	14.073	12.64 5
-067 -011 -949 -882 -808	$\begin{array}{c} 15{\cdot}677\\ 15{\cdot}629\\ 15{\cdot}572\\ 15{\cdot}506\end{array}$	$15.279 \\ 15.233 \\ 15.233$	14.871	14.458		TO-049
·011 ·949 ·882 ·808	$15.629 \\ 15.572 \\ 15.506$	15.233	14 000	11 100	14.041	13.616
·949 ·882 ·808	$15.572 \\ 15.506$		14.829	14.420	14.006	13.583
·882 ·808	15.506	15.181	14.781	14.377	13.966	13.546
808		15.123	14.729	14.329	13.922	13.506
	15.438	15.061	14.671	14.276	13.873	13.462
.727	15.363	14.992	14.607	14.217	$13 \cdot 819$	13.413
.639	15.282	14.915	14.537	14.152	13.760	13.358
·544	15.194	14.834	14.462	14.083	13.697	13.300
5·440	15.098	14.745	14.380	14.007	13.627	13.236
·328	14.993	14.647	14.290	13.925	13.551	13.167
.208	14.882	14.544	14.194	13.837	13.470	13.093
5·078	14.761	$14 \cdot 431$	14.089	13.740	13.381	13.011
·938	14.629	14.309	13.976	13.634	13.283	12.920
·789	14.490	14.178	13.855	13.522	13.179	12.824
. 628	14.339	14.036	13.723	13.399	13.065	12.718
l·454	14.175	13.883	13.580	13.266	12.940	12.602
ŀ236	14.000	13.719	13.426	13.122	12.806	12.478
ŀ005	13.813	13.643	13.260	13.066	12.661	12.343
<b>3</b> ∙860	13.613	13.354	13.082	12.799	12.504	12.197
3.637	13.401	13.153	12.892	12.621	12.337	12.041
49	13.177	12.940	12.690	12.431	12.158	11.874
		12.715	12.477	12.228	11.968	11.695
	50		12.253	12.015	11.766	11.505
		51	50	11.790	11.552	11.303
			- 52	53	11.327	11.089
					54	10.866
					·	55
	•440 •328 •208 •078 •938 •789 •628 •454 •236 •005 •860 •637 <b>49</b>	0440       15-098         -440       15-098         -328       14-993         -078       14-761         -938       14-629         -789       14-490         -628       14-339         -454       14-175         -236       14-000         -005       13-813         -637       13-613         +637       13-177         50	13     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     14     13     <	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

 $a_{xy}$ 

#### A1924-29 ultimate

				y			
u	62	61	60	59	58	57	56
21	10.677	11.115	11.556	11.999	12.443	12.889	13.333
- 22	10.673	11.111	11.551	11.994	12.437	12.882	13.325
23	10.669	11.106	11.545	11.987	$12 \cdot 429$	$12 \cdot 873$	13.315
24	10.664	11.100	11.539	11.979	12.420	12.863	13.303
28	10.658	11.093	11.531	11.970	12.410	12.852	13-291
- 26	10.650	11.085	11.521	11.959	12.398	$12 \cdot 839$	13.276
27	10.641	11.074	11.510	11.945	12.383	12.823	13.259
28	10.631	11.062	11.497	11.931	12.367	$12 \cdot 805$	13.239
29	10.619	11.048	11.482	11.914	12.348	12.784	13.216
3(	10.604	11.033	11.465	11.895	12.327	12.760	13-189
31	10.588	11.015	11.445	11.873	12.303	12.734	13.159
32	10.570	10.995	11.422	11.848	12.276	12.704	13.125
35	10.549	10.972	11.397	11.821	12.245	12.669	13.088
34	10.527	10.947	11.369	11.790	12.211	12.632	13.047
38	10.502	10.919	11.338	11.756	12.173	12.591	13.002
- 36	10.475	10.889	11.304	11.718	12.132	12.546	12.953
3	10.445	10.856	11.268	11.678	12.088	12.498	12.901
- 38	10.412	10.819	11.228	11.634	12.039	12.445	12.843
39	10.375	10.779	11.183	11.585	11.986	12.386	12.779
40	10.335	10.736	11.137	11.533	11.929	12.324	12.710
41	10.291	10.688	11.085	11.475	11.866	12.255	12.634
42	10.244	10.635	11.026	11.412	11.796	12.178	12.552
- 48	10.194	10.579	10.964	11.344	11.721	12.097	12.463
44	10.137	10.516	10.895	11.268	11.638	12.007	12.365
4	10.074	10.447	10.818	11.185	11.548	11.908	12-258
- 40	10.002	10.372	10.736	11.095	11.450	11.802	12.143
47	9.929	10.289	10.645	10.996	11.343	11.686	12.018
- 48	9.845	10.197	10.546	10.888	11.226	11.559	11.882
49	9.754	10.097	10.438	10.772	11.100	11.424	11.737
5(	9.655	9.989	10.321	10.646	10.964	11.278	11.581
5]	9.548	9.874	10.196	10.511	10.819	11.121	11.413
52	9.433	9.749	10.061	10.365	10.663	10.954	11.234
5	9.309	9.615	9.916	10.209	10.496	10.776	11.044
54	9.175	9.471	9.762	10.043	10.318	10.586	10.842
5	9.032	9.317	9.596	9.865	10.129	10.385	10-631
- 5(	8.880	9.154	9.421	9.678	9.930	10.174	10.408
57	8.720	8.982	9.237	9.483	9.722	9.953	
58	8.551	8.802	9.045	9.278	9.505	EN	56
08	0.919	8.012	0.942	9.003	58	ə7 	
60	8.185	8.411	8.630	59			
61	7.992	8.206					
	7.780		60				
62	1 100	61	00				

### A1924-29 ultimate

				y			
x	63	64	65	66	67	68	69
21	10.243	9.808	9.380	8.959	8.541	8·134	7.739
22	10.240	9.805	9.377	8.957	8.539	8.133	7.738
23	10.236	9.802	9.374	8.955	8.537	8.131	7.736
24	10.232	9.798	9.371	8.952	8.535	8.129	7.734
25	10.227	9.793	9.367	8.948	8.532	8.127	7.732
26	10.220	9.787	9.362	8.943	8.528	8.124	7.729
27	10.212	9.780	9.355	8.938	8.523	8.119	7.725
28	10.203	9.771	9.348	8.931	8.517	8.114	7.721
29	10.192	9.761	9.340	8.923	8.510	8.108	7.716
30	10.178	9.751	9.330	8-915	8.502	8.100	7.709
31	10.163	9.738	9.318	8.904	8.492	8.091	7.701
32	10.146	9.723	9.304	8.892	8.481	8.081	7.692
33	10.128	9.706	9.290	8.879	8.469	8.070	7.683
34	10.109	9.687	9.273	8.864	8.456	8.059	7.672
35	10.087	9.666	9.254	8.847	8.441	8.046	7.660
36	10.061	9.644	9.233	8.829	8.425	8.031	7.647
37	10.034	9.620	9.211	8.809	8.407	8.015	7.632
38	10.004	9.593	9.187	8.787	8.387	7.997	7.616
<b>39</b>	9.971	9.563	9.160	8.763	8.365	7.977	7.599
40	9.936	9.531	9.131	8.738	8.343	7.957	7.581
41	9.897	9.496	9.099	8.710	8·318	7.934	7.561
42	9.853	9.457	9.065	8.678	8.289	7.909	7.538
43	9.807	9.416	9.028	8.644	8.259	7.882	7.514
44	9.755	9.369	8.986	<b>8</b> ∙606	8.225	7.851	7.487
45	9.698	9.317	8.939	8.563	8.186	7.817	7.456
46	9.638	9.260	8.887	8.516	8.144	7.780	7.422
47	9.569	9.197	8.829	8.464	8.097	7.738	7.384
48	9.490	9.127	8.766	8.408	8.046	7.691	7.343
49	9.408	9.053	8.700	8.348	7.990	7.641	7.297
50	9.318	8.971	8.626	8.280	7.928	7.585	7.246
51	9.219	8.881	8.543	8.204	7.860	7.522	7.191
52	9.113	8.783	8.454	8.123	7.787	7.456	7.130
53	8.998	8.677	8.357	8.035	7.707	7.383	7.063
54	8.875	8.564	8.252	7.939	7.619	7.303	6.991
55	8.742	8.441	8-139	7.836	7.525	7.216	6.912
56	8.601	8.310	8.118	7.725	7.423	7.123	6.827
57	8.451	8.172	7.890	7.606	7.313	7.023	6.736
58	8.292	8.025	7.753	7.479	7.197	6.917	6.639
59	8.125	7.870	7.609	7.445	7.074	6.804	6.535
	63	64	65	66	67	68	69

## A1924-29 ultimate

76           5.308         5.308           5.307         5.307           5.305         5.304           5.303         5.301           5.299         5.296           5.293         5.290           5.290         5.286	<b>75</b> <b>5</b> ·618 <b>5</b> ·617 <b>5</b> ·616 <b>5</b> ·615 <b>5</b> ·614 <b>5</b> ·612 <b>5</b> ·610 <b>5</b> ·608 <b>5</b> ·605 <b>5</b> ·601 <b>5</b> ·597	74 5.941 5.940 5.939 5.937 5.935 5.933 5.931 5.929 5.926	73           6·275           6·275           6·275           6·274           6·273           6·271           6·269           6·267           6·265	72 6.621 6.621 6.620 6.619 6.617 6.615 6.613 6.613 6.610	71 6.980 6.980 6.979 6.978 6.976 6.976 6.974 6.971	70 7·353 7·352 7·351 7·350 7·348
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 5.618\\ 5.618\\ 5.617\\ 5.616\\ 5.615\\ 5.614\\ 5.612\\ 5.610\\ 5.608\\ 5.608\\ 5.605\\ 5.601\\ 5.597\end{array}$	5.941 5.941 5.940 5.939 5.937 5.935 5.933 5.931 5.929 5.926	$\begin{array}{c} 6.275\\ 6.275\\ 6.274\\ 6.273\\ 6.273\\ 6.269\\ 6.269\\ 6.265\\ 6.265\\ 6.262\\ \end{array}$	$\begin{array}{c} 6{\cdot}621\\ 6{\cdot}621\\ 6{\cdot}620\\ 6{\cdot}619\\ \hline\\ 6{\cdot}617\\ 6{\cdot}615\\ 6{\cdot}613\\ 6{\cdot}610\\ \end{array}$	6.980 6.980 6.979 6.978 6.978 6.976 6.974 6.971	7·353 7·352 7·351 7·350 7·348
$\begin{array}{c} 5.308\\ 5.307\\ 5.306\\ 5.305\\ 5.304\\ 5.303\\ 5.301\\ 5.299\\ 5.296\\ 5.293\\ 5.290\\ 5.290\\ 5.286\\ 5.290\\ 5.286\\ 5.$	$5.618 \\ 5.617 \\ 5.616 \\ 5.615 \\ 5.612 \\ 5.612 \\ 5.601 \\ 5.605 \\ 5.601 \\ 5.597 \\ \end{bmatrix}$	5.941 5.940 5.939 5.937 5.935 5.933 5.931 5.929 5.926	6·275 6·274 6·273 6·271 6·269 6·267 6·265 6·265	6.621 6.620 6.619 6.617 6.615 6.613 6.610	6·980 6·979 6·978 6·976 6·974 6·971	7·352 7·351 7·350 7·348
$5 \cdot 307$ $5 \cdot 306$ $5 \cdot 305$ $5 \cdot 304$ $5 \cdot 303$ $5 \cdot 301$ $5 \cdot 299$ $5 \cdot 296$ $5 \cdot 293$ $5 \cdot 290$ $5 \cdot 290$ $5 \cdot 290$	$5.617 \\ 5.616 \\ 5.615 \\ 5.614 \\ 5.612 \\ 5.610 \\ 5.608 \\ 5.605 \\ 5.601 \\ 5.597 \\ $	5·940 5·939 5·937 5·935 5·933 5·931 5·929 5·926	6·274 6·273 6·271 6·269 6·267 6·265 6·262	6.620 6.619 6.617 6.615 6.613 6.610	6·979 6·978 6·976 6·974 6·971	7·351 7·350 7·348
$5 \cdot 306$ $5 \cdot 305$ $5 \cdot 304$ $5 \cdot 303$ $5 \cdot 301$ $5 \cdot 299$ $5 \cdot 296$ $5 \cdot 293$ $5 \cdot 290$ $5 \cdot 290$ $5 \cdot 290$	5.616 5.615 5.614 5.612 5.610 5.608 5.605 5.601 5.597	5-939 5-937 5-935 5-933 5-931 5-929 5-926	6·273 6·271 6·269 6·267 6·265 6·262	6·619 6·617 6·615 6·613 6·610	6·978 6·976 6·974 6·971	7·350
$\begin{array}{c} 5\cdot 305 \\ 5\cdot 304 \\ 5\cdot 303 \\ 5\cdot 301 \\ 5\cdot 299 \\ 5\cdot 296 \\ 5\cdot 293 \\ 5\cdot 290 \\ 5\cdot 290 \\ 5\cdot 290 \\ 5\cdot 286 \\ 5\cdot 291 \\ 5\cdot 29$	5.615 5.614 5.612 5.610 5.608 5.605 5.601 5.597	5·937 5·935 5·933 5·931 5·929 5·926	$\begin{array}{c} 6 \cdot 271 \\ 6 \cdot 269 \\ 6 \cdot 267 \\ 6 \cdot 265 \\ 6 \cdot 262 \end{array}$	6·617 6·615 6·613 6·610	$6.976 \\ 6.974 \\ 6.971$	7.348
5·304 5·303 5·301 5·299 5·296 5·293 5·290 5·290 5·290	5.614 5.612 5.610 5.608 5.605 5.601 5.597	5·935 5·933 5·931 5·929 5·926	$\begin{array}{c} 6 \cdot 269 \\ 6 \cdot 267 \\ 6 \cdot 265 \\ 6 \cdot 262 \end{array}$	6·615 6·613 6·610	6·974 6·971	
5·303 5·301 5·299 5·296 5·293 5·290 5·290 5·290	$5.612 \\ 5.610 \\ 5.608 \\ 5.605 \\ 5.601 \\ 5.597 \\ $	5.933 5.931 5.929 5.926	6·267 6·265 6·262	6·613	6.971	7.345
5·301 5·299 5·296 5·293 5·290 5·290 5·286	5-610 5-608 5-605 5-601 5-597	5.931 5.929 5.926	6·265 6·262	6.610		7.342
5·299 5·296 5·293 5·290 5·286	5-608 5-605 5-601 5-597	5·929 5·926	6.262	00101	6-968	7.338
5·296 5·293 5·290 5·286	$5.605 \\ 5.601 \\ 5.597$	5.926		6.606	6.964	7.333
5·293 5·290 5·286	$5.601 \\ 5.597$		6.258	6.602	6.959	7.328
5·290 5·286	5.597	5.921	6.253	6.597	6.953	7.321
5.286		5.916	6.247	6.591	6.946	7.313
~ 001	5.592	5.910	6.241	6.584	6.939	7.305
5.281	5.586	5.904	6.234	6.576	6.930	7.295
5.275	5.580	5.897	6.226	6.567	6.920	7.284
5.269	5.573	5.890	6.218	6.558	6.909	7.272
5.262	5.566	5.882	6-209	6.548	6.898	7.258
5.255	5.558	5.873	6.199	6.537	6.886	7.244
5.247	5.549	5.862	6.187	6.524	6.872	7.230
5.239	5.540	5.851	6.175	6.511	6.857	7.213
5.230	5.530	5.839	6.162	6.496	6.840	7.194
5.219	5.518	5.827	6.148	6.480	6.821	7.174
5.209	5.506	5.814	6.133	6.462	6.802	7.153
5.197	5.492	5.799	6.116	6.442	6.780	7.129
5.182	5.477	5.781	6.096	6.421	6.756	7.101
5.167	5.460	5.762	6.075	6.397	6.730	7.071
5.150	5.441	5.740	6.051	6.370	6.700	7.037
5.131	5.419	5.716	6.023	6·340	6.666	7.000
5.110	5.395	5.689	5.993	6.307	6.628	6.959
5.086	5.368	5.659	5.960	6.270	6.586	6.913
5.059	5.339	5.626	5.923	6.229	6.541	6.862
5.031	5.307	5.591	5.884	6.185	6.492	6.808
4.999	5.271	5.552	5.840	6.136	6.438	6.748
<b>4</b> ·963	5.232	5.508	5.791	<b>6</b> ∙082	<b>6</b> ∙378	6.681
4.924	5.189	5.459	5.737	6.023	6.313	6.610
4.881	5.142	5.406	5.679	5.959	6.243	6.533
4.835	5.090	5.349	5.616	5.890	6.167	6.449
4.785	5.034	5.289	5.549	5.817	6.086	6.360
<b>4</b> ·731	4.974	5.224	5.477	5.738	5.999	6.265

### 211/2%

x - 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	<b>77</b> 5.011 5.011 5.010	<b>78</b>	79	<i>y</i>			
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	<b>77</b> 5.011 5.011 5.010 5.000	<b>78</b>	79	00			
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	5.011 5.011 5.010 5.000	4.726		00	81	82	83
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	5·011 5·010	1.40	4.454	4·195	3.950	3.718	3.497
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	5.010	4.726	4.454	4.195	3.950	3.718	3.497
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42		4.725	4.453	4.194	3.949	3.717	3.496
25         26           27         28           29         30           31         32           33         34           35         36           37         38           39         40           41         42	5.008	4.725	4.453	4.194	3.949	3.717	3.496
26         27         28         29         30         31         32         33         34         35         36         37         38         39         40         41         42	5.008	4.724	4.453	4.194	3.949	3.717	3.496
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	5.008	4.724	4.452	4.194	3.948	3.717	3.496
28           29           30           31           32           33           34           35           36           37           38           39           40           41           42	5.007	4.723	4.452	4.194	3.948	3.717	3.496
29 30 31 32 33 34 35 36 37 38 39 40 41 42	5.005	4.722	4.451	4.193	3.947	3.716	3.496
30         31           32         33           33         34           35         36           37         38           39         40           41         42	5.003	4.720	4.490	4.192	3.946	3.715	3.495
31 32 33 34 35 36 37 38 39 40 41 42	5.000	4.718	4.448	<b>4</b> ·190	3.945	3.714	3.494
32 33 34 35 36 37 38 39 40 41 42	4.998	4.715	4.446	4.188	3.943	3.712	3.492
33 34 35 36 37 38 39 40 41 42	4.995	4.712	4.443	4.186	3.941	3.710	3.490
34 35 36 37 38 39 40 41 42	4.992	4.709	4.440	4.183	3.938	3.707	3.487
35 36 37 38 39 40 41 42	4.987	4.705	4.430	4.180	3.935	3.705	3.485
36 37 38 39 40 41 42	4.982	4.701	4.432	4.176	3.932	<b>3</b> ·702	3.483
37 38 39 40 41 42	4.977	4.696	4.428	4.172	3.929	3.699	3.480
38 39 40 41 42	4.971	4.690	4.423	4.168	3.925	3.696	3.477
39 40 41 42	4.964	4.684	4.418	4.163	3.921	3.692	3.474
40 41 42	4.957	4.678	4.412	4·158	3.916	3.688	3.471
41 42	4.949	4.672	4.407	4.153	3.912	3.684	3.467
42	4.941	4.665	4.401	4.147	3.907	3.679	3.463
	4.932	4.657	4.393	4.141	3.901	3.674	3.458
43	4.922	4.648	4.385	4.134	3.895	3.669	3.454
44	4.911	4.638	4.376	4.126	3.888	3.663	3.449
45	<b>4</b> ·899	4.627	4.366	<b>4</b> ·117	3.881	3.656	3.442
46	4.885	4.616	4.355	4.109	3.872	3.649	3.436
47	4.870	4.603	4.343	4.099	3.862	3.641	3.429
48	4.854	4.587	4.331	4.086	3.852	3.631	3.420
49	4.834	4.909	4.310	4.073	3.841	3.620	3.409
50	4·813	4.550	4.299	4.058	3.828	3.608	3.398
51	<b>4</b> ·789	4.530	4·280	4.041	3.812	3.595	3.388
52	4.764	4.509	4.261	4.022	3.795	3.580	3.375
53	4.735	4.483	4.238	4.001	3.778	3.563	3.360
<b>ə</b> 4	4.703	4.494	4.211	3.818	3.757	3.949	3.343
55	4.668	4.421	4.183	3.954	3.734	3.525	3.325
56	4.630	4.386	4.152	3.926	3.709	3.503	3.305
57	4.588	4.349	4.118	3.896	3.682	3.478	3.283
58	4.543	4.309	4.041	3.863	3.652	3.491	3.259
59	4.494	4.266	4.041	3.827	3.018	3.422	3.233
	77	78	79	80	81	82	83

# 2½%

_				u xy			
r				y	•		
n	90	89	88	87	86	85	84
2	2.256	2.407	2.564	2.727	2.903	3.090	3.287
- 23	2.256	2.407	2.564	2.727	2.903	3.090	3.287
23	2.256	$2 \cdot 407$	2.564	2.727	2.903	3.090	3.287
2	2.256	2.407	2.564	2.727	2.903	3.090	3.287
2	2.256	2.407	2.564	2.727	2.903	<b>3</b> ∙090	3.287
2	2.256	2.407	2.564	2.727	2.903	3.090	3.286
2'	2.256	2.407	2.564	2.727	2.903	3.090	3.286
- 29	2.256	$2 \cdot 407$	2.564	2.727	2.903	3.090	3.286
2	2.256	2.406	2.563	2.726	2.903	3.089	3.285
3	2.255	2.405	2.562	2.725	2.902	3.088	3.284
3	$2 \cdot 255$	2.405	2.562	2.724	2.901	3.087	3.282
3	2.254	2.405	2.561	2.723	2.900	3.085	3.281
- 3	2.253	2.404	2.560	2.722	2.897	3.083	3.279
34	2.252	2.403	2.559	2.721	2.896	3.082	3.277
3	2.251	2.402	2.558	2.720	2.895	3.080	3.275
- 30	$2 \cdot 249$	2.400	2.556	2.718	2.893	3.078	3.273
3'	2.248	2.398	2.554	2.716	2.891	3.076	3.270
- 31	$2 \cdot 247$	2.397	2.552	2.714	2.889	3.073	3.267
3	2.245	2.395	2.550	2.711	2.886	3.070	3.264
4	2.243	2.393	2.548	2.709	2.884	3.067	3.261
4	$2 \cdot 241$	2.391	2.546	2.707	2.881	3.064	3.257
4:	2.239	2.388	2.543	2.704	2.878	3.061	3.253
43	2.237	2.386	2.540	2.701	2.875	3.058	3.249
4	2.235	2.383	2.537	2.698	2.871	3.054	3.244
4	2.232	2.380	2.534	2.694	2.866	3.048	3.239
- 40	2.229	2.377	2.530	2.689	2.862	3.043	3.233
4	2.226	2.373	2.526	2.684	2.857	3.037	3.226
- 48	2.222	2.369	2.521	2.679	2.850	3.030	3.219
49	2.218	2.365	2.516	2.673	2.843	3.021	3.209
5(	2.213	2.360	2.510	2.666	2.835	3.012	3.199
5	2.208	2.354	2.504	2.659	2.827	3.004	3.190
52	2.202	2.347	2.496	2.651	2.818	2.993	3.179
-5	2.195	2.339	2.487	2.642	2.808	2.981	3.166
54	2.188	2.330	2.478	2.631	2.796	2.969	3.151
5	2.180	2.321	2.467	2.619	2.784	2.955	3.135
5	2.171	2.311	2.455	2.606	2.770	2.939	3.117
5	$2 \cdot 160$	$2 \cdot 299$	$2 \cdot 443$	2.592	2.753	2.921	3.097
- 5	$2 \cdot 149$	2.286	2.429	2.576	2.736	2.902	3.075
5	2.137	2.272	2.414	2.559	2.719	2.881	3.051
	90	89	88	87	86	85	84