

### 4.16.1 Loi normale N(0,1)

Fonction de répartition N(0,1) :  $F_X(x) = \int_{-\infty}^x f_X(x)dx$

x	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998

Quantiles particuliers		0.5	0.6	0.7	0.8	0.9	0.95	0.975	0.99	0.995	0.999
p	x = F <sup>-1</sup> (p)	0.0000	0.2533	0.5244	0.8416	1.2816	1.6449	1.9600	2.3263	2.5758	3.0902

## 4.16.2 Loi $\chi^2$

$$\alpha : \int_x^{\infty} f_X(x) dx$$

d.l.	$\alpha=1\%$	$\alpha=2.5\%$	$\alpha=5\%$	$\alpha=10\%$
1	6.63	5.02	3.84	2.71
2	9.21	7.38	5.99	4.61
3	11.34	9.35	7.81	6.25
4	13.28	11.14	9.49	7.78
5	15.09	12.83	11.07	9.24
6	16.81	14.45	12.59	10.64
7	18.48	16.01	14.07	12.02
8	20.09	17.53	15.51	13.36
9	21.67	19.02	16.92	14.68
10	23.21	20.48	18.31	15.99
11	24.73	21.92	19.68	17.28
12	26.22	23.34	21.03	18.55
13	27.69	24.74	22.36	19.81
14	29.14	26.12	23.68	21.06
15	30.58	27.49	25.00	22.31
16	32.00	28.85	26.30	23.54
17	33.41	30.19	27.59	24.77
18	34.81	31.53	28.87	25.99
19	36.19	32.85	30.14	27.20
20	37.57	34.17	31.41	28.41
25	44.31	40.65	37.65	34.38
30	50.89	46.98	43.77	40.26
35	57.34	53.20	49.80	46.06
40	63.69	59.34	55.76	51.81
45	69.96	65.41	61.66	57.51
50	76.15	71.42	67.50	63.17
60	88.38	83.30	79.08	74.40
80	112.33	106.63	101.88	96.58
100	135.81	129.56	124.34	118.50
120	158.95	152.21	146.57	140.23
140	181.84	174.65	168.61	161.83
200	249.45	241.06	233.99	226.02
300	359.91	349.87	341.40	331.79
400	468.72	457.31	447.63	436.65
500	576.49	563.85	553.13	540.93
1000	1106.97	1089.53	1074.68	1057.72

### 4.16.3 Loi Student (unilatéral)

d.l.	$\alpha : \int_x^{\infty} f_X(x)dx$			
	$\alpha = 1\%$	$\alpha = 2.5\%$	$\alpha = 5\%$	$\alpha = 10\%$
1	31.821	12.706	6.314	3.078
2	6.965	4.303	2.920	1.886
3	4.541	3.182	2.353	1.638
4	3.747	2.776	2.132	1.533
5	3.365	2.571	2.015	1.476
6	3.143	2.447	1.943	1.440
7	2.998	2.365	1.895	1.415
8	2.896	2.306	1.860	1.397
9	2.821	2.262	1.833	1.383
10	2.764	2.228	1.812	1.372
11	2.718	2.201	1.796	1.363
12	2.681	2.179	1.782	1.356
13	2.650	2.160	1.771	1.350
14	2.624	2.145	1.761	1.345
15	2.602	2.131	1.753	1.341
16	2.583	2.120	1.746	1.337
17	2.567	2.110	1.740	1.333
18	2.552	2.101	1.734	1.330
19	2.539	2.093	1.729	1.328
20	2.528	2.086	1.725	1.325
25	2.485	2.060	1.708	1.316
30	2.457	2.042	1.697	1.310
35	2.438	2.030	1.690	1.306
40	2.423	2.021	1.684	1.303
45	2.412	2.014	1.679	1.301
50	2.403	2.009	1.676	1.299
60	2.390	2.000	1.671	1.296
80	2.374	1.990	1.664	1.292
100	2.364	1.984	1.660	1.290
120	2.358	1.980	1.658	1.289
140	2.353	1.977	1.656	1.288
200	2.345	1.972	1.653	1.286
300	2.339	1.968	1.650	1.284
400	2.336	1.966	1.649	1.284
500	2.334	1.965	1.648	1.283
1000	2.330	1.962	1.646	1.282

## 4.16.4 Loi Fisher

Loi Fisher,  $\alpha=5\%$ ;  $\alpha = \int_x^{\infty} f_X(x)dx$

d.l. au numérateur

	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28	30	40	50	100	1000
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.36	246.46	247.32	248.01	248.58	249.05	249.45	249.80	250.10	251.14	251.77	253.04	254.19
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.39	19.40	19.41	19.42	19.43	19.44	19.45	19.45	19.45	19.46	19.46	19.46	19.47	19.48	19.49	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.71	8.69	8.67	8.66	8.65	8.64	8.63	8.62	8.62	8.59	8.58	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.87	5.84	5.82	5.80	5.79	5.77	5.76	5.75	5.75	5.72	5.70	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.64	4.60	4.58	4.56	4.54	4.53	4.52	4.50	4.50	4.46	4.44	4.41	4.37
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.96	3.92	3.90	3.87	3.86	3.84	3.83	3.82	3.81	3.77	3.75	3.71	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.53	3.49	3.47	3.44	3.43	3.41	3.40	3.39	3.38	3.34	3.32	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.24	3.20	3.17	3.15	3.13	3.12	3.10	3.09	3.08	3.04	3.02	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.03	2.99	2.96	2.94	2.92	2.90	2.89	2.87	2.86	2.83	2.80	2.76	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.86	2.83	2.80	2.77	2.75	2.74	2.72	2.71	2.70	2.66	2.64	2.59	2.54
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.64	2.60	2.57	2.54	2.52	2.51	2.49	2.48	2.47	2.43	2.40	2.35	2.30
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.48	2.44	2.41	2.39	2.37	2.35	2.33	2.32	2.31	2.27	2.24	2.19	2.14
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.37	2.33	2.30	2.28	2.25	2.24	2.22	2.21	2.19	2.15	2.12	2.07	2.02
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.29	2.25	2.22	2.19	2.17	2.15	2.13	2.12	2.11	2.06	2.04	1.98	1.92
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.23	2.18	2.15	2.12	2.10	2.08	2.07	2.05	2.04	1.99	1.97	1.91	1.85
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.17	2.13	2.10	2.07	2.05	2.03	2.01	2.00	1.98	1.94	1.91	1.85	1.79
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.13	2.09	2.05	2.03	2.00	1.98	1.97	1.95	1.94	1.89	1.86	1.80	1.74
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.09	2.05	2.02	1.99	1.97	1.95	1.93	1.91	1.90	1.85	1.82	1.76	1.70
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.06	2.02	1.99	1.96	1.93	1.91	1.90	1.88	1.87	1.82	1.79	1.73	1.66
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.04	1.99	1.96	1.93	1.91	1.89	1.87	1.85	1.84	1.79	1.76	1.70	1.63
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.95	1.90	1.87	1.84	1.81	1.79	1.77	1.76	1.74	1.69	1.66	1.59	1.52
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.95	1.89	1.85	1.81	1.78	1.76	1.74	1.72	1.70	1.69	1.63	1.60	1.52	1.45
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.86	1.82	1.78	1.75	1.72	1.70	1.68	1.66	1.65	1.59	1.56	1.48	1.40
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97	1.89	1.84	1.79	1.75	1.72	1.70	1.67	1.65	1.64	1.62	1.57	1.53	1.45	1.36
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.88	1.82	1.77	1.73	1.70	1.68	1.65	1.63	1.62	1.60	1.54	1.51	1.43	1.34
90	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94	1.86	1.80	1.76	1.72	1.69	1.66	1.64	1.62	1.60	1.59	1.53	1.49	1.41	1.31
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.85	1.79	1.75	1.71	1.68	1.65	1.63	1.61	1.59	1.57	1.52	1.48	1.39	1.30
110	3.93	3.08	2.69	2.45	2.30	2.18	2.09	2.02	1.97	1.92	1.84	1.78	1.74	1.70	1.67	1.64	1.62	1.60	1.58	1.56	1.50	1.47	1.38	1.28
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.78	1.73	1.69	1.66	1.63	1.61	1.59	1.57	1.55	1.50	1.46	1.37	1.27
130	3.91	3.07	2.67	2.44	2.28	2.17	2.08	2.01	1.95	1.90	1.83	1.77	1.72	1.68	1.65	1.62	1.60	1.58	1.56	1.55	1.49	1.45	1.36	1.26
140	3.91	3.06	2.67	2.44	2.28	2.16	2.08	2.01	1.95	1.90	1.82	1.76	1.72	1.68	1.65	1.62	1.60	1.57	1.56	1.54	1.48	1.44	1.35	1.25
150	3.90	3.06	2.66	2.43	2.27	2.16	2.07	2.00	1.94	1.89	1.82	1.76	1.71	1.67	1.64	1.61	1.59	1.57	1.55	1.54	1.48	1.44	1.34	1.24
500	3.86	3.01	2.62	2.39	2.23	2.12	2.03	1.96	1.90	1.85	1.77	1.71	1.66	1.62	1.59	1.56	1.54	1.52	1.50	1.48	1.42	1.38	1.28	1.14
1000	3.85	3.00	2.61	2.38	2.22	2.11	2.02	1.95	1.89	1.84	1.76	1.70	1.65	1.61	1.58	1.55	1.53	1.51	1.49	1.47	1.41	1.36	1.26	1.11
10000	3.84	3.00	2.61	2.37	2.22	2.10	2.01	1.94	1.88	1.83	1.75	1.69	1.64	1.60	1.57	1.54	1.52	1.50	1.48	1.46	1.40	1.35	1.25	1.08

d.l. au dénominateur