

MSE-213

Probability and statistics for materials science

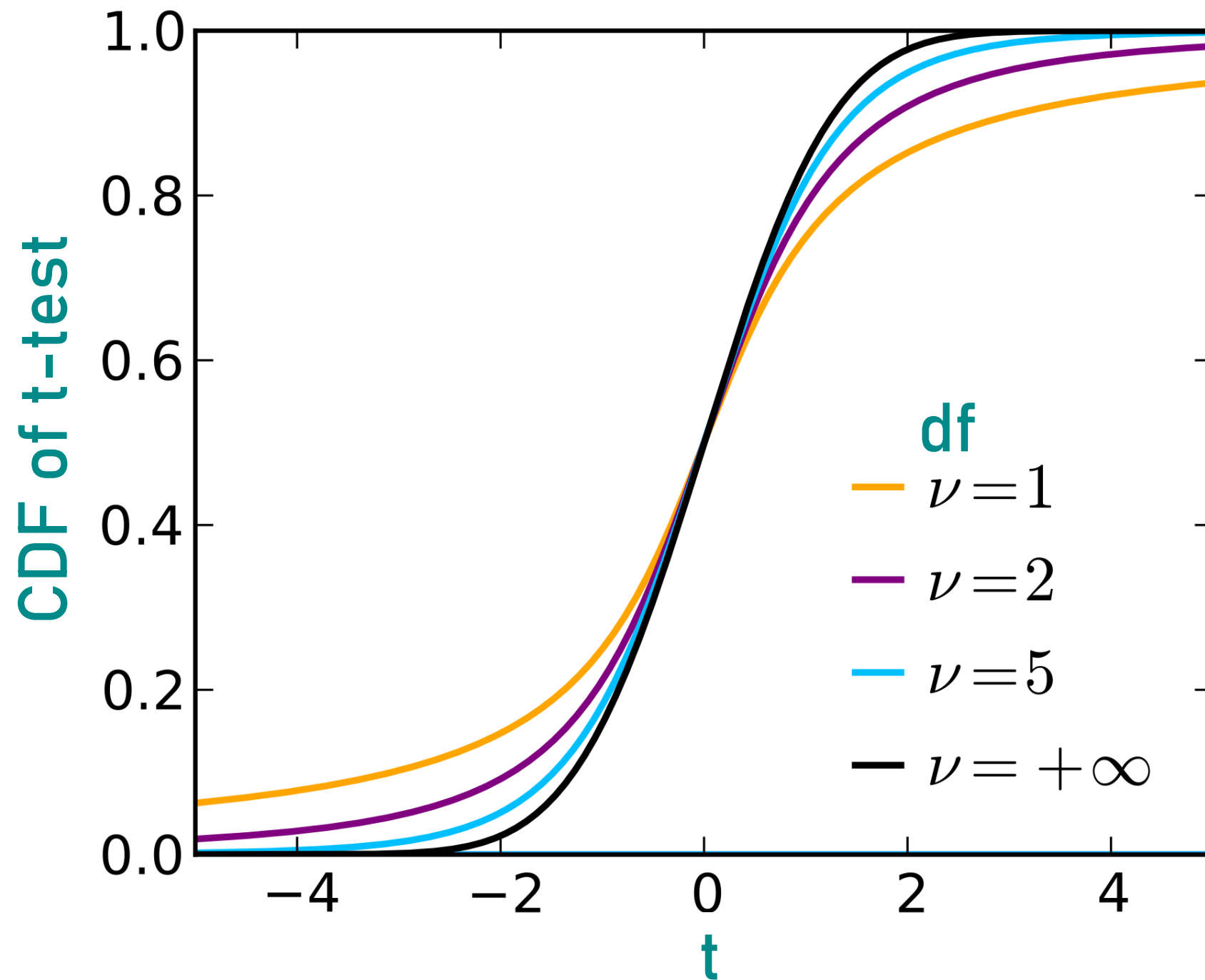
Lecture 8

**LECTURE NOTES WILL BE
POSTED ONLINE LATER TODAY**

Recap: The t-test

df	$1 - \alpha$			
	0.95	0.975	0.99	0.995
1	6.3138	12.706	31.821	63.657
2	2.9200	4.3027	6.9646	9.9248
3	2.3534	3.1824	4.5407	5.8409
4	2.1318	2.7764	3.7469	4.6041
5	2.0150	2.5706	3.3649	4.0321
6	1.9432	2.4469	3.1427	3.7074
7	1.8946	2.3646	2.9980	3.4995
8	1.8595	2.3060	2.8965	3.3554
9	1.8331	2.2622	2.8214	3.2498
10	1.8125	2.2281	2.7638	3.1693
11	1.7959	2.2010	2.7181	3.1058
12	1.7823	2.1788	2.6810	3.0545
13	1.7709	2.1604	2.6503	3.0123
14	1.7613	2.1448	2.6245	2.9768
15	1.7531	2.1314	2.6025	2.9467
16	1.7459	2.1199	2.5835	2.9208
17	1.7396	2.1098	2.5669	2.8982
18	1.7341	2.1009	2.5524	2.8784
19	1.7291	2.0930	2.5395	2.8609
20	1.7247	2.0860	2.5280	2.8453
30	1.6973	2.0423	2.4573	2.7500
40	1.6839	2.0211	2.4233	2.7045
50	1.6759	2.0086	2.4033	2.6778
60	1.6706	2.0003	2.3901	2.6603
70	1.6669	1.9944	2.3808	2.6479
80	1.6641	1.9901	2.3739	2.6387
90	1.6620	1.9867	2.3685	2.6316
100	1.6602	1.9840	2.3642	2.6259
200	1.6525	1.9719	2.3451	2.6006
300	1.6499	1.9679	2.3388	2.5923
400	1.6487	1.9659	2.3357	2.5882
500	1.6479	1.9647	2.3338	2.5857

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100	1.6602
200	1.6525
300	1.6499
400	1.6487
500	1.6479



Paired/differential 2-sample tests

Two samples of n_1 and n_2 observations from two populations with means μ_1 and μ_2 and variances σ_1^2 and σ_2^2

Test $H_0: \mu_1 = \mu_2$ against $H_1: \mu_1 \neq \mu_2$ (two-sided test)

Test $H_0: \mu_1 \leq \mu_2$ against $H_1: \mu_1 > \mu_2$ (one-sided test)

Test $H_0: \mu_1 \geq \mu_2$ against $H_1: \mu_1 < \mu_2$ (one-sided test)

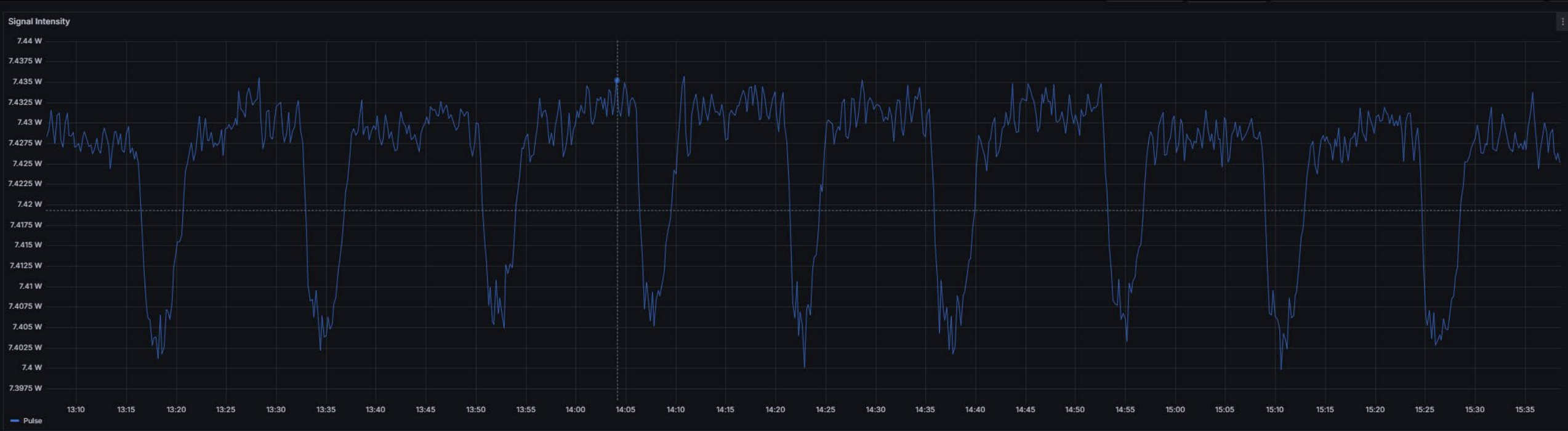
Test $H_0: \mu_1 = \mu_2$ against $H_1: \mu_1 < \mu_2$ (one-sided test)

Test $H_0: \mu_1 = \mu_2$ against $H_1: \mu_1 > \mu_2$ (one-sided test)

Test $H_0: \mu_1 \leq \mu_2$ against $H_1: \mu_1 > \mu_2$ (one-sided test)

Test $H_0: \mu_1 \geq \mu_2$ against $H_1: \mu_1 < \mu_2$ (one-sided test)

Paired/differential 2-sample tests



The chi2-test

Chi-squared test

Chi-squared test

Chi-squared test

Chi-squared test

Chi-squared test

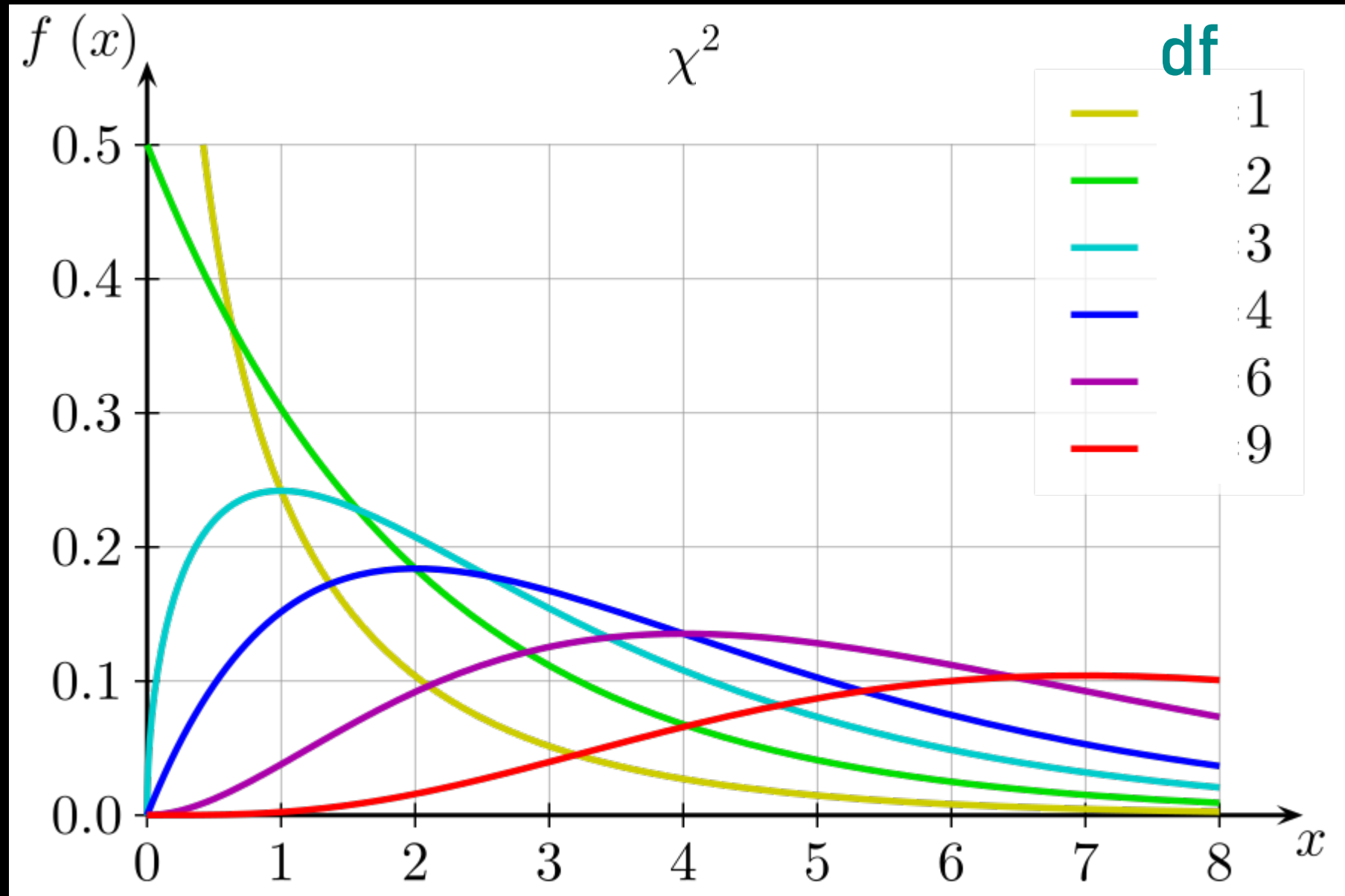
Chi-squared test

Chi-squared test

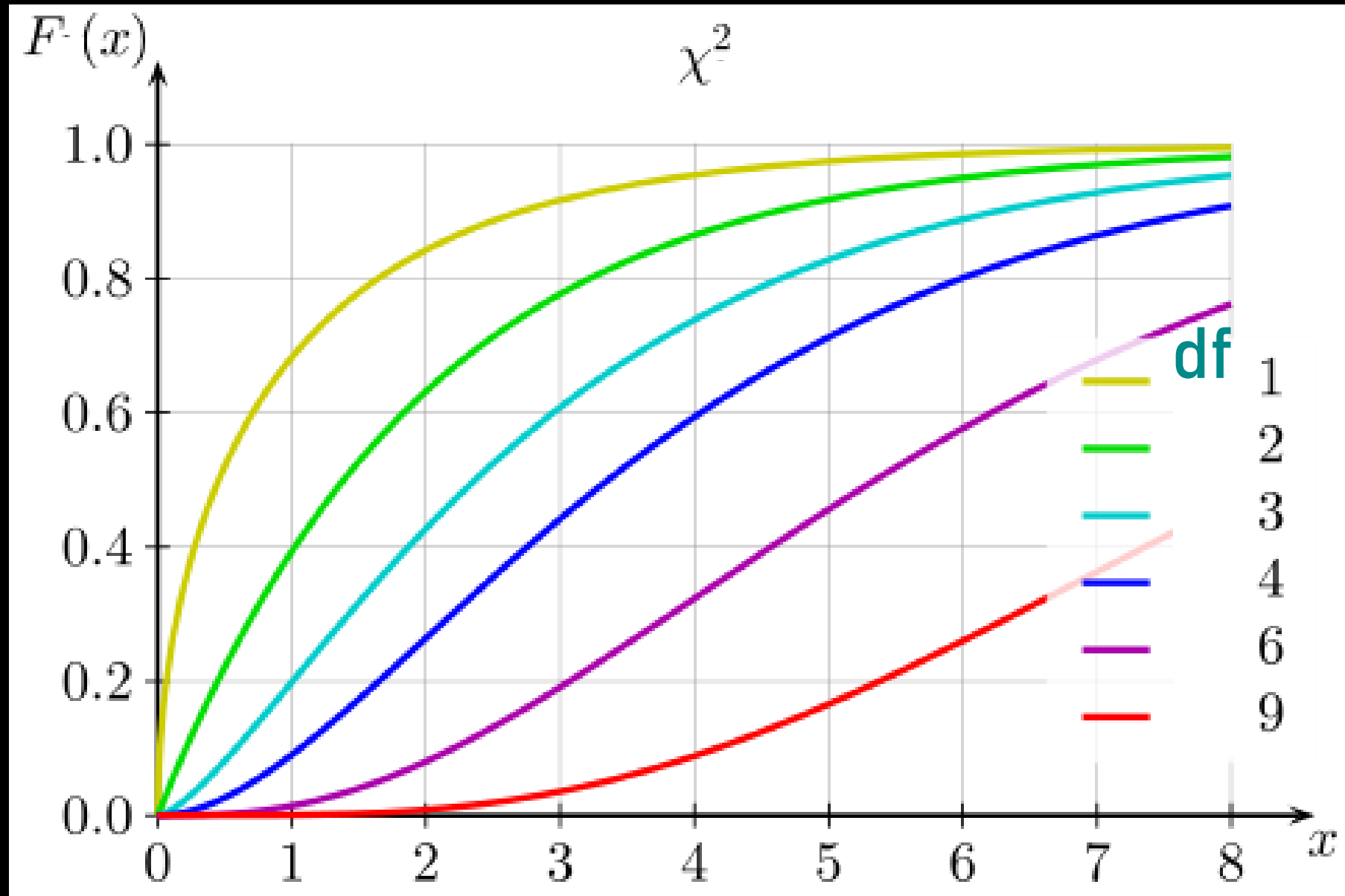
Chi-squared test

Chi-squared test

The chi2-test



The chi2-test



Quantiles de la loi khi-deux

ν	$q\chi^2_\nu(1\%)$	$q\chi^2_\nu(2,5\%)$	$q\chi^2_\nu(5\%)$	$q\chi^2_\nu(95\%)$	$q\chi^2_\nu(97,5\%)$	$q\chi^2_\nu(99\%)$
1	0,0 ³ 1571	0,0 ³ 9821	0,003932	3,841	5,024	6,635
2	0,02010	0,05064	0,1026	5,991	7,378	9,210
3	0,1148	0,2158	0,3518	7,815	9,348	11,34
4	0,2971	0,4844	0,7107	9,488	11,14	13,28
5	0,5543	0,8312	1,145	11,07	12,83	15,09
6	0,8721	1,237	1,635	12,59	14,45	16,81
7	1,239	1,690	2,167	14,07	16,01	18,48
8	1,646	2,180	2,733	15,51	17,53	20,09
9	2,088	2,700	3,325	16,92	19,02	21,67
10	2,558	3,247	3,940	18,31	20,48	23,21
11	3,053	3,816	4,575	19,68	21,92	24,72
12	3,571	4,404	5,226	21,03	23,34	26,22
13	4,107	5,009	5,892	22,36	24,74	27,69
14	4,660	5,629	6,571	23,68	26,12	29,14
15	5,229	6,262	7,261	25,00	27,49	30,58
16	5,812	6,908	7,962	26,30	28,85	32,00
17	6,408	7,564	8,672	27,59	30,19	33,41
18	7,015	8,231	9,390	28,87	31,53	34,81
19	7,633	8,907	10,12	30,14	32,85	36,19
20	8,260	9,591	10,85	31,41	34,17	37,57