Litt Info om Eksamen

- I år blir det digital eksamen
- Hva trenges:
  - Egen maskin med «Safe exam browser» (mulighet til å låne)
- Hvordan blir eksamen:
  - ca 20% multiple choice
  - ca 80% “vannlige” oppgaver som tidligere år
- Hjelpemidler
  - kalkulator, papir og blyant, formelhefte og et gult ark

ACT! forsningproject

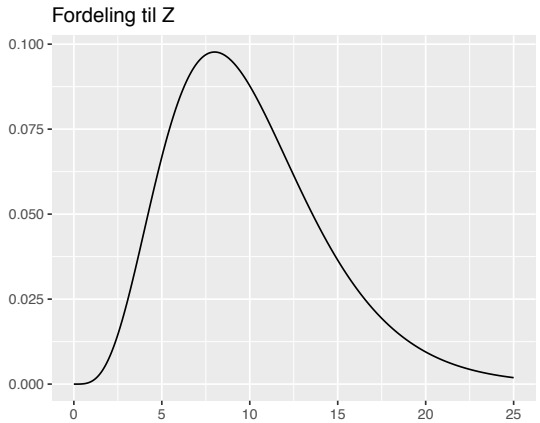
ACT! (ACTive learning in core courses in mathematics and statistics for engineering education) ønsker vi å finne ut hvilke ressurser, hvilke læringsstiler og hvilken organisering som gir best læringsutbytte, og hvilket faginnhold som er mest relevant for fremtidige sivilingeniører

- Fill inn spørreundersøkelse på kurset web-sida for å bidra
- Trenger ikke å gjør det igjen om du allerede har gjørt det en gang før

Hvordan lage konfidensintervall (I)

La $X_1, X_2, \ldots, X_n$ være u.i.f. SV fra en populasion med fordeling $f(x;\theta)$. Vi ønsker å lage en $100(1-\alpha)$ KI for den uskjent parameter θ

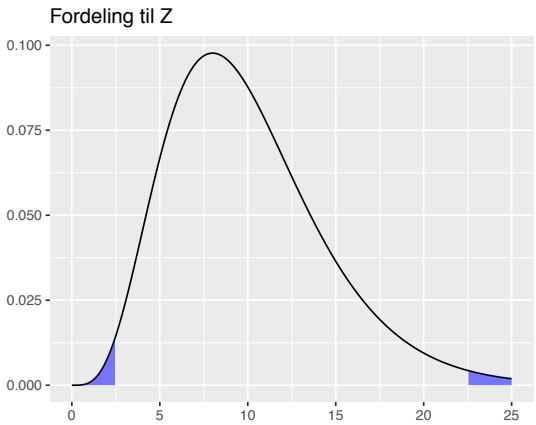
1. Start med en estimator $\hat{\theta}$
2. Finn en funksjon $Z = h(\hat{\theta}, \theta)$ slik at fordeling til Z er
   - kjent
   - uten ukjent parameter



Hvordan lage konfidensintervall (II)

3. Finn verdiene $z_{\alpha/2}$ og $z_{(1-\alpha/2)}$ slik at

$$P(Z > z_{\alpha/2}) = \alpha/2$$
$$P(Z > z_{(1-\alpha/2)}) = 1 - \alpha/2$$



4. Løs ulikhetene mht θ for å finne intervallet $(\hat{\theta}_L, \hat{\theta}_U)$ slik at

$$P(\hat{\theta}_L < \theta < \hat{\theta}_U) = 1 - \alpha$$

Historisk: Student-T fordeling

- W.S. Gosset (1876-1937) was employed by the Guinness Brewing Company of Dublin.
- Sample sizes available for experimentation in brewing were necessarily small, and Gosset knew that a correct way of dealing with small samples was needed.
- He consulted Karl Pearson (1857-1936) of Universiy College in London about the problem. Pearson told him the current state of knowledge was unsatisfactory.

- The following year Gosset undertook a course of study under Pearson. An outcome of his study was the publication in 1908 of Gosset's paper on "The Probable Error of a Mean," which introduced a form of what later became known as Student's t-distribution.
- Gosset's paper was published under the pseudonym "Student."

Regneregler for moment genererende funksjon

Hvis SV $X \sim f(x)$ da er moment genererende funksjon

$$M_X(t) = \int e^{tx} f(x)\, dx$$

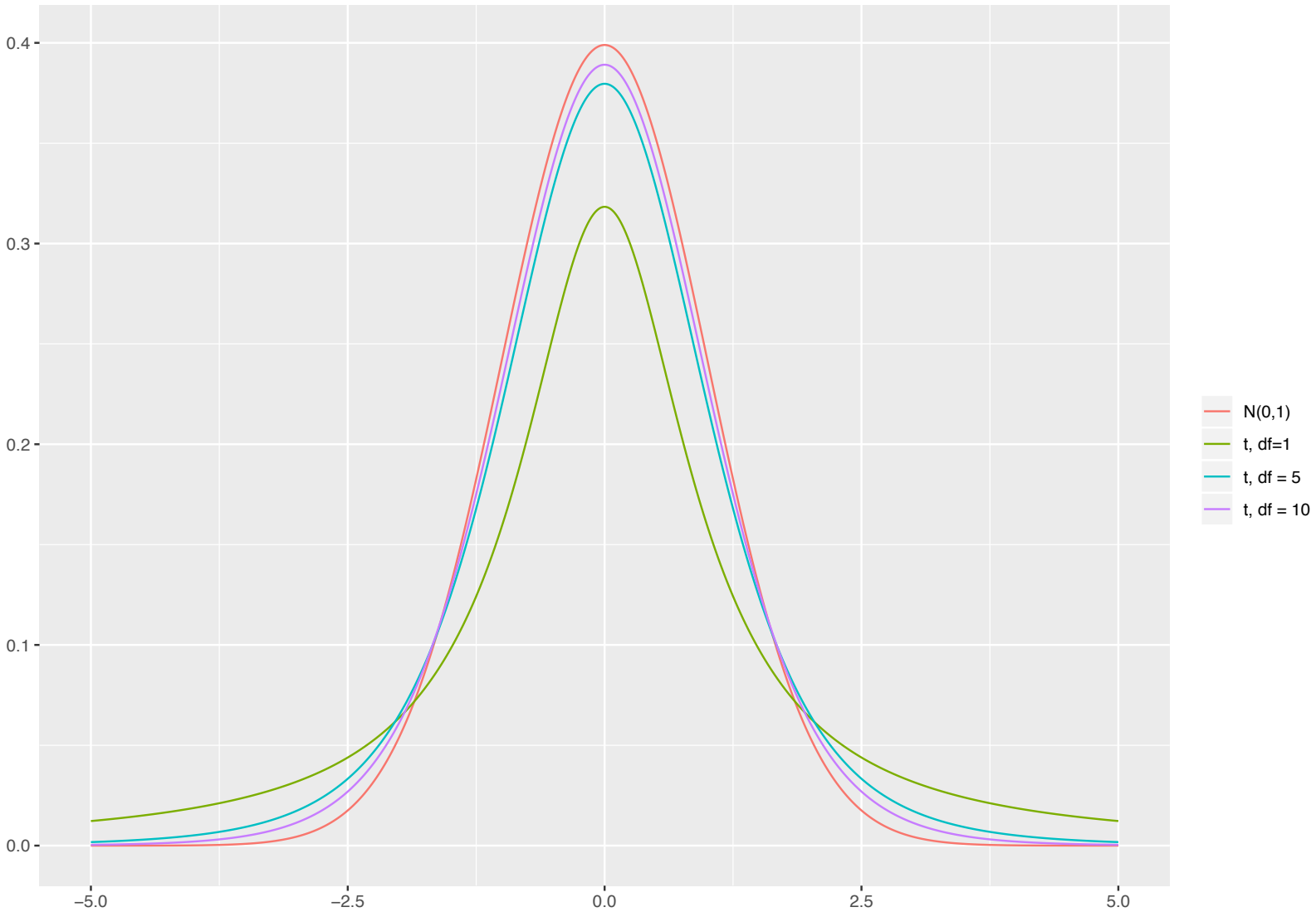
1. $M_{X+a} = e^{at} M_X(t)$
2. $M_{aX} = M_X(at)$
3. La $X_1, X_2, \ldots, X_n$ vaere uavhengige SV med mgf $M_1(t), M_2(t), \ldots, M_n(t)$. La

$$Y = X_1 + X_2 + \cdots + X_n$$

da er

$$M_Y(t) = M_1(t)\ M_2(t) \ldots M_n(t) = \prod M_i(t)$$

t-fordeling



t-fordeling

Kritiske verdier i t-fordelingen

$$P(T > t_{\alpha,\nu}) = \alpha$$

$\nu \backslash \alpha$	.150	.100	.075	.050	.025	.010	.005	.001	.0005
1	1.963	3.078	4.165	6.314	12.706	31.821	63.657	318.309	636.619
2	1.386	1.886	2.282	2.920	4.303	6.965	9.925	22.327	31.599
3	1.250	1.638	1.924	2.353	3.182	4.541	5.841	10.215	12.924
4	1.190	1.533	1.778	2.132	2.776	3.747	4.604	7.173	8.610
5	1.156	1.476	1.699	2.015	2.571	3.365	4.032	5.893	6.869
6	1.134	1.440	1.650	1.943	2.447	3.143	3.707	5.208	5.959
7	1.119	1.415	1.617	1.895	2.365	2.998	3.499	4.785	5.408
8	1.108	1.397	1.592	1.860	2.306	2.896	3.355	4.501	5.041
9	1.100	1.383	1.574	1.833	2.262	2.821	3.250	4.297	4.781
10	1.093	1.372	1.559	1.812	2.228	2.764	3.169	4.144	4.587
11	1.088	1.363	1.548	1.796	2.201	2.718	3.106	4.025	4.437
12	1.083	1.356	1.538	1.782	2.179	2.681	3.055	3.930	4.318
13	1.079	1.350	1.530	1.771	2.160	2.650	3.012	3.852	4.221
14	1.076	1.345	1.523	1.761	2.145	2.624	2.977	3.787	4.140
15	1.074	1.341	1.517	1.753	2.131	2.602	2.947	3.733	4.073
16	1.071	1.337	1.512	1.746	2.120	2.583	2.921	3.686	4.015
17	1.069	1.333	1.508	1.740	2.110	2.567	2.898	3.646	3.965
18	1.067	1.330	1.504	1.734	2.101	2.552	2.878	3.610	3.922
19	1.066	1.328	1.500	1.729	2.093	2.539	2.861	3.579	3.883
20	1.064	1.325	1.497	1.725	2.086	2.528	2.845	3.552	3.850
21	1.063	1.323	1.494	1.721	2.080	2.518	2.831	3.527	3.819
22	1.061	1.321	1.492	1.717	2.074	2.508	2.819	3.505	3.792
23	1.060	1.319	1.489	1.714	2.069	2.500	2.807	3.485	3.768
24	1.059	1.318	1.487	1.711	2.064	2.492	2.797	3.467	3.745
25	1.058	1.316	1.485	1.708	2.060	2.485	2.787	3.450	3.725
26	1.058	1.315	1.483	1.706	2.056	2.479	2.779	3.435	3.707
27	1.057	1.314	1.482	1.703	2.052	2.473	2.771	3.421	3.690
28	1.056	1.313	1.480	1.701	2.048	2.467	2.763	3.408	3.674
29	1.055	1.311	1.479	1.699	2.045	2.462	2.756	3.396	3.659
30	1.055	1.310	1.477	1.697	2.042	2.457	2.750	3.385	3.646
35	1.052	1.306	1.472	1.690	2.030	2.438	2.724	3.340	3.591
40	1.050	1.303	1.468	1.684	2.021	2.423	2.704	3.307	3.551
50	1.047	1.299	1.462	1.676	2.009	2.403	2.678	3.261	3.496
60	1.045	1.296	1.458	1.671	2.000	2.390	2.660	3.232	3.460
80	1.043	1.292	1.453	1.664	1.990	2.374	2.639	3.195	3.416
100	1.042	1.290	1.451	1.660	1.984	2.364	2.626	3.174	3.390
120	1.041	1.289	1.449	1.658	1.980	2.358	2.617	3.160	3.373
∞	1.036	1.282	1.440	1.645	1.960	2.326	2.576	3.090	3.291