

Math 323 Section 9.1 Problems

1. The height of hobbits is normally distributed, with mean θ and standard deviation v , both unknown constants.

Ten randomly selected hobbits have heights of 51, 47, 48, 48, 43, 50, 42, 49, 45 and 46 inches.

- (a) Calculate $\hat{\theta}$ and \hat{S}_n^2 .
(b) Give a 95% confidence interval for the average height of hobbits.
(c) Suppose we only want an upper bound for the average height. Find a $\hat{\Theta}_n^+$ so that

$$P(\theta \leq \hat{\Theta}_n^+) = 0.95$$

using the t -distribution.

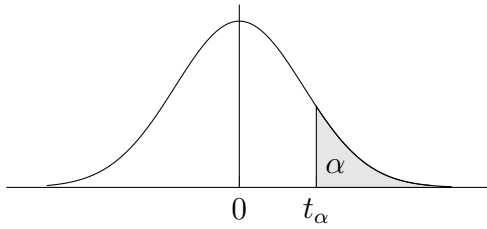
2. The costs of repairing minivan bumpers damaged by a 5-mph collision, for seven models of minivan, are given by 1154, 1106, 1560, 1769, 2299, 1741 and 3179 (dollars). Assume that repair costs are normally distributed.

- (a) Calculate $\hat{\theta}$ and \hat{S}_n^2 .
(b) Find a 95% confidence interval for the true average repair cost.

3. Suppose we sample independent Bernoulli random variables with unknown success probability θ . In n trials we find k successes.

- (a) What is $\hat{\theta}$?
(b) Using the normal approximation, what is the variance of $\hat{\theta}$?
(c) Compute \hat{S}_n^2 for k successes in n trials.

Critical values of t



df	$t_{0.100}$	$t_{0.050}$	$t_{0.025}$	$t_{0.010}$	$t_{0.005}$
1	3.078	6.314	12.71	31.82	63.66
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
∞	1.282	1.645	1.960	2.326	2.576