TV safety The manufacturer of a metal stand for home TV sets must be sure that its product will not fail under the weight of the TV. Since some larger sets weigh nearly 300 pounds, the company's safety inspectors have set a standard of ensuring that the stands can support an average of over 500 pounds. Their inspectors regularly subject a random sample of the stands to increasing weight until they fail. They test the hypothesis H_0: $\mu = 500$ against H_A: $\mu > 500$, using the level of significance $\alpha = 0.01$. If the sample of stands fails to pass this safety test, the inspectors will not certify the product for sale to the general public.

a) Is this an upper-tail or lower-tail test? In the context of the problem, why do you think this is important?
b) Explain what will happen if the inspectors commit a Type I error.
c) Explain what will happen if the inspectors commit a Type II error.

TV safety, revisited The manufacturer of the metal TV stands in Exercise 43 is thinking of revising its safety test.

a) If the company's lawyers are worried about being sued for selling an unsafe product, should they increase or decrease the value of α? Explain.
b) In this context, what is meant by the power of the test?
c) If the company wants to increase the power of the test, what options does it have? Explain the advantages and disadvantages of each option.

(참고: CPMP is a new education method)

CPMP, again During the study described in Exercise 57, students in both CPMP and traditional classes took another algebra test that did not allow them to use calculators. The table below shows the results. Are the mean scores of the two groups significantly different?

Math Program	n	Mean	SD
CPMP	312	29.0	18.8
Traditional	265	38.4	16.2

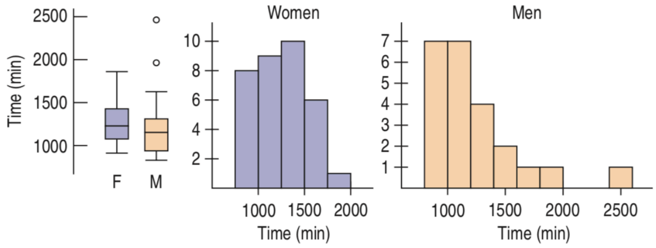
Performance on Algebraic Symbolic Manipulation Without Use of Calculators

a) Write appropriate hypotheses.
b) Do you think the assumptions for inference are satisfied? Explain.
c) Here is computer output for this hypothesis test. Explain what the P-value means in this context.

2-Sample t-Test of $\mu1 - \mu2 \neq 0$
t-Statistic $= -6.451$ w/574.8761 df
P < 0.0001

d) State a conclusion about the CPMP program.

Swim the Lake 2013 revisited As we saw in chapter 8, Exercise 40, between 1954 and 2013, swimmers have crossed Lake Ontario 58 times. Both women and men have made the crossing. Here are some plots (we've omitted a crossing by Vikki Keith, who swam a round trip—North to South to North—in 3390 minutes):



Summary statistics are as follows:

Group	Count	Mean	StdDev
F	34	1257.09	261.10
M	23	1226.04	382.85

Summary of Time (min)

Is there a difference between the mean amount of time (in minutes) it takes female and male swimmers to swim the lake?

a) Construct and interpret a 95% confidence interval for the difference between female and male crossing times (technology gives 35.7 df).
b) perform the two sample t-test

t*(35.7) for 95% (two-tailed) = 2.0287
Website for t to p: http://vassarstats.net/tabs_t.html?

Wheelchair marathon 2013 The Boston Marathon has had a wheelchair division since 1977. Who do you think is typically faster, the men's marathon winner on foot or the women's wheelchair marathon winner? Because the conditions differ from year to year, and speeds have improved over the years, it seems best to treat these as paired measurements. Here are summary statistics for the pairwise differences in finishing time (in minutes):

Summary of wheelchrF − runM
$N = 37$
$Mean = -4.88$
$SD = 35.227$

a) Comment on the assumptions and conditions.
b) Assuming that these times are representative of such races and the differences appeared acceptable for inference, construct and interpret a 95% confidence interval for the mean difference in finishing times.
c) Would a hypothesis test at $\alpha = 0.05$ reject the null hypothesis of no difference? What conclusion would you draw?

t*(36) for 95% (two-tailed) = 2.0281