Hypothesis test questions:

1. Androstenedione (andro) is a steroid that is thought by some athletes to increase strength. Researchers investigated this claim by giving andro to one group of men and a placebo to a control group of men. One of the variables measured in the experiment was the increase in "lat pulldown" strength (in pounds) of each subject after four weeks. (A lat pulldown is a type of weightlifting exercise.) The data is summarized below.

	Control	Andro
n	9	10
$\bar{y}$	14.4	20.0
SD	13.3	12.5

Conduct a t test to investigate the claim that andro increases strength at α = 0.10. [Note: Formula (6.7.1) yields 16.5 df.]

2. Research has shown that for mammals giving birth to a son versus a daughter places a greater strain on mothers. Does this affect the health of their next child? A study compared the birthweights (kg) of humans born after a male versus after a female. Summary statistic for the sample of size 76 are given the following table; the data appeared to be normally distributed.

SEX OF ELDER SIBLING	Male	Female
n	33	43
$\bar{y}$	3.32	3.63
s	0.62	0.63

Use a t test with α = 0.05 and to investigate the research hypothesis that birthweight is lower when the elder sibling is male. [Note: Formula (6.7.1) yields 69.5 df.]

3. Researchers studied the effect of a houseplant federalizer on radish sprout growth. They randomly selected some radish seeds to serve as controls, while others were planted in aluminum planters to which fertilizer sticks were added. Other conditions were held constant between the two groups. The following table shows data on the heights of plants (in cm) two weeks after germination.

	CONTROL	FERTILIZED
n	28	28
$\bar{y}$	2.58	2.04
s	0.65	0.72

Use a t test to investigate whether the fertilizer has an effect on average radish sprout growth. Use α = 0.05. [Note: Formula (6.7.1) yields 53.5df.]

4. After surgery a patient's blood volume is often depleted. In one study, the total circulating volume of blood plasma was measured for each patient immediately after surgery. After infusion of a "plasma expander" into the bloodstream, the plasma volume was measured again and the increase in plasma volume (mL) was calculated. Two of the plasma expanders used were albumin (25 patients) and polygelatin (14 patients). The accompanying table reports the increase in plasma volume. [Note: formula (6.7.1) yields 33.6 df.]

	ALBUMIN	POLYGELATIN
n	25	14
$\bar{y}$	490	240
SE	60	30

Use a t test to compare the mean increase in plasma volume in the two treatments. Let α = 0.01.

5. A plant physiologist conducted an experiment to determine whether mechanical stress can retard the growth of soybean plants. Young plants were randomly allocated to two groups of 13 plants each. Plants in one group were mechanically agitated by shaking for 20 minutes twice daily, while plants in the other group were not agitated. After 16 days of growth the total stem length (cm) of each plant was measured with the result give in the accompanying table.

	CONTROL	STRESS
n	13	13
$\bar{y}$	30.59	27.78
s	2.13	1.73

Use a t test to investigate the research hypothesis that stress tends to retard growth at α = 0.01. [Note: Formula (6.7.1) yields 23 df.]

6. Nutritional researchers conducted an investigation of two high-fiber diets intended to reduce serum cholesterol level. Twenty men with high serum cholesterol were randomly allocated to receive an "oat" diet or a "bean" diet for 21 days. The table summarizes the fall (before minus after) in serum cholesterol levels.

DIET	Oat	Bean
n	10	10
$\bar{y}$	53.6	55.5
SD	31.1	29.4

Use a t test to compare the diets at the 5% significance level. [Note: Formula (6.7.1) yields 17.9 df.]

7. The following table shows the number of bacteria colonies present in each of several petri dishes, after E. coli bacteria were added to the dishes and they were incubated for 24 hours. The "soap" dishes contained a solution prepared from ordinary soap; the "control" dishes contained a solution of sterile water.

	CONTROL	SOAP
n	8	7
$\bar{y}$	41.8	32.4
s	**15.6**	**22.8**
SE	5.5	8.6

Use a t test to investigate whether the soap affects the number of bacteria colonies that form. Use $\alpha = 0.10$. [Note: Formula (6.7.1) yields 10.4 df.]

8. Postoperative ilius (POI) is a form a of gastrointestinal dysfunction that commonly occurs after abdominal surgery and results in absent or delayed gastrointestinal motility. Does rocking in a chair after abdominal surgery reduce POI duration? Sixty-six postoperative abdominal surgery patients were randomly divided into two groups. The experimental group received standard care plus the use of a rocking chair while the control group received only standard care. For each patient, the postoperative time until first flatus (days) (an indication that the POI has ended) was measured. The results are tabulated here.

	Rocking	Control
n	34	32
$\bar{y}$	3.16	3.88
SD	0.86	0.80

Is there evidence that the use of the rocking chair reduces duration? Use a t test with $\alpha = 0.05$. [Note: Formula (6.7.1) yields 64.0 df.]