

AP Stats

What Type of Test?

Part #1

Name _____ Pd _____

Twins.

1. In 2001 a national vital statistics report indicated that about 3% of all births produced twins. Is the rate of twin births the same among very young mothers? Data from a large city hospital found only seven sets of twins were born to 469 teenage girls. Test an appropriate hypothesis and state your conclusion.

Cereal.

2. The data below shows the sugar content (as a percentage of weight) of several national brands of children's and adult's cereals. Create and interpret a 95% confidence interval for the difference in mean sugar content.

Children's Cereals: 40.3, 55, 45.7, 43.3, 50.3, 45.9, 53.5, 43, 44.2, 44, 47.4, 44, 33.6, 55.1, 48.8, 50.4, 37.8, 60.3, 46.6

Adult's Cereals: 20, 30.2, 2.2, 7.5, 4.4, 22.2, 16.6, 14.5, 21.4, 3.3, 6.6, 7.8, 10.6, 16.2, 14.5, 4.1, 15.8, 4.1, 2.4, 3.5, 8.5, 10, 1, 4.4, 1.3, 8.1, 4.7, 18.4

Depression.

3. A study published in the *Archives of General Psychiatry* in March 2001 examined the impact of depression on a patient's ability to survive cardiac disease. Researchers identified 450 people with cardiac disease, evaluated them for depression, and followed the group for four years. Of the 361 patients with no depression, 67 died. Of the 89 patients with minor or major depression, 26 died. Among people who suffer from cardiac disease, are depressed patients more likely to die than non-depressed ones?

Football.

4. During the 2000 season, the home team won 138 of the 240 regular season National Football League games. Is this strong evidence of a home field advantage in professional football? Test an appropriate hypothesis and state your conclusion, including a confidence interval.

Normal Temperature.

5. A medical researcher measured the body temperatures of a randomly selected sample of adults. The data he collected are summarized below. 98.6°F is commonly assumed to be "normal." Do these data suggest otherwise? Explain using statistical evidence, including a 98% confidence interval.

Summary	Temperature
Count	52
Mean	98.285
Median	98.2
MidRange	98.6
StdDev	0.6824
Range	2.8
IQR	1.05

Hot Dogs.

6. A nutrition laboratory tests 40 "reduced sodium" hot dogs, finding that the mean sodium content is 310 mg, with a standard deviation of 36 mg. Find a 95% confidence interval for the mean sodium content of this brand of hot dog.

WebZine.

7. A magazine is considering the launch of an online edition. The magazine plans to go ahead only if it's convinced that more than 25% of its current readers would subscribe. The magazine contacts a simple random sample of 500 current subscribers, and 137 of those surveyed expressed interest. What should the company do? State and test an appropriate hypothesis in defense of your answer to the company.

Baseball.

8. American League baseball teams play their games with the designated hitter (DH) rule, meaning that pitchers do not bat. The league believes that replacing the pitcher, traditionally a weak hitter, with another player in the batting order produces more runs and generates more interest among fans. Below are the average numbers of runs scored in American League and National League stadiums for the first half of the 2001 season.

American				National			
11.1	10.8	10.8	10.3	14.0	11.6	10.4	10.3
10.3	10.1	10.0	9.5	10.2	9.5	9.5	9.5
9.4	9.3	9.2	9.2	9.5	9.1	8.8	8.4
	9.0	9.3		8.3	8.2	8.1	7.9

State your conclusion about the American League's claim of more runs.

Pregnancy.

9. In 1998, a San Diego reproductive clinic reported 42 live births to 157 women under the age of 38, but only seven live births for 89 clients aged 38 and older. Is this strong evidence of a difference in the effectiveness of the clinic's methods for older women?

Politics and Sex.

10. One month before the election, a poll of 630 randomly selected voters showed 54% planning to vote for a certain candidate. A week later it became known that he had had an extramarital affair, and a new poll showed only 51% of 1010 voters supporting him. Do these results indicate a decrease in voter support for his candidacy?

Parking.

11. Hoping to lure more shoppers downtown, a city builds a new public parking garage in the central business district. The city plans to pay for the structure through parking fees. During a two-month period (44 weekdays), daily fees collected average \$126, with a standard deviation of \$15. Write a 90% confidence interval for the mean daily income this parking garage will generate.

Handy.

12. A factory hiring people to work on an assembly line gives job applicants a test of manual agility. This test counts how many strangely shaped pegs the applicant can fit into matching holes in a one-minute period. The table below summarizes the data by gender of the job applicant. Assuming that all conditions necessary for inference are met, find a 95% confidence interval for the difference in the mean number of pegs that could be placed by men and women.

	Male	Female
Number of subjects	50	50
Mean pegs placed	19.39	17.91
SD of pegs placed	2.52	3.39

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Jury.

13. Census data for a certain county shows that 19% of the adult residents are Hispanic. Suppose 72 people are called for jury duty, and only nine of them are Hispanic. Does this apparent under representation of Hispanics call into question the fairness of the jury selection system? Explain using statistical evidence.

Computer Use.

14. A Gallup telephone poll of 1240 teens conducted in 2001 found that boys were more likely than girls to play computer games, by a margin of 77% to 65%. An equal number of boys and girls were surveyed. Give a 95% confidence interval for the difference in game playing by gender.

Summer School.

15. Having done poorly on their math final exams in June, six students repeat the course in summer school, then take another exam in August. If we consider these students representative of all students who might attend this summer school in previous years, do these results provide evidence that the program is worthwhile?

June:	54	49	68	66	62	62
August:	50	65	74	64	68	72

Shopping.

16. A survey of 430 randomly chosen adults found that 21% of the 222 men and 18% of the 208 women had purchased books online. Is there evidence that men are more likely than women to make online purchases of books? Test an appropriate hypothesis and state your conclusion in context.

Yogurt.

17. *Consumer Reports* tested 14 brands of vanilla yogurt and found the following numbers of calories per serving:

160	200	220	230	120	180	140
130	170	190	80	120	100	170

Create a 95% confidence interval for the average calorie content of vanilla yogurt.

Job Satisfaction.

18. A company institutes an exercise break for its workers to see if this will improve job satisfaction, as measured by a questionnaire that assess workers' satisfaction. Scores for 10 randomly selected workers before and after implementation of the exercise program are shown. The company wants to assess the effectiveness of the exercise program. Test an appropriate hypothesis and state your conclusion, including an appropriate confidence interval.

Worker Number	Job Satisfaction Index	
	Before	After
1	34	33
2	28	36
3	29	50
4	45	41
5	26	37
6	27	41
7	24	39
8	15	21
9	15	20
10	27	37

Meals.

20. A college student is on a “meal program.” His budget allows him to spend an average of \$10 per day for the semester. He keeps track of his daily food expenses for two weeks; the data are given in the table. Is there strong evidence that he will overspend his food allowance?

Date	Cost (\$)
7-29	15.20
7-30	23.20
7-31	3.20
8-1	9.80
8-2	19.53
8-3	6.25
8-4	0
8-5	8.55
8-6	20.05
8-7	14.95
8-8	23.45
8-9	6.75
8-10	0
8-11	9.01

Seeds.

21. A garden center wants to store leftover packets of vegetable seeds for sale the following spring, but the center is concerned that the seeds may not germinate at the same rate a year later. The manager finds a packet of last year’s green bean seeds and plants them as a test. Although the packet claims a germination of 92%, only 171 of 200 test seeds sprout. Is this evidence that the seeds have lost viability during a year in storage? Test an appropriate hypothesis and state your conclusion.

Gasoline.

22. Many drivers of cars that can run on regular gas actually buy premium in the belief that they will get better gas mileage. To test that belief, we use 10 cars in a company fleet in which all cars run on regular gas. Each car is filled first with either regular or premium gasoline, decided by a coin toss, and the mileage for that tank full is recorded. Then the mileage is recorded again for the same cars for a tank full of the other kind of gasoline. We don’t let the drivers know about this experiment. Here are the results in miles per gallon:

Car #	1	2	3	4	5	6	7	8	9	10
Regular	16	20	21	22	23	22	27	25	27	28
Premium	19	22	24	24	25	25	26	26	28	32

Is there evidence that cars get significantly better fuel economy with premium gasoline?

Maze.

23. Psychology experiments sometimes involve testing the ability of rats to navigate mazes. The mazes are classified according to difficulty, as measured by the mean length of time it takes rats to find the food at the end. One researcher needs a maze that will take rats an average of about one minute to solve. He tests one maze on several rats, collecting the data that are shown. Test the hypothesis that the mean competition time for this maze is 60 seconds. What is your conclusion, in context?

Time (sec)	
38.4	57.6
46.2	55.5
62.5	49.5
38.0	40.9
62.8	44.3
33.9	93.8
50.4	47.9
35.0	69.2
52.8	46.2
60.1	56.3
55.1	

Mammograms.

24. It's widely believed that regular mammograms may detect breast cancer early, resulting in fewer deaths from that disease. One study that investigated this issue over a period of 18 years was published during the 1970s. Among 30,565 women who had never had mammograms, 196 died of breast cancer, while only 153 of 30,131 who had undergone screening died of breast cancer. Do these results suggest that mammograms may be an effective screening tool to reduce breast cancer deaths?

Braking.

25. In a test of braking performance, a tire manufacturer measured the stopping distance for one of its tire models. On a test track, a car made repeated stops from 60 miles per hour. The test was run on both dry and wet pavement, with results as shown in the table. Is there evidence that the tires did significantly better on the dry pavement than on the wet pavement?

Stopping Distance (ft)	
Dry	Wet
145	211
152	191
141	220
143	207
131	198
148	208
126	206
140	177
135	183
133	223