/

Explore

Case Processing Summary

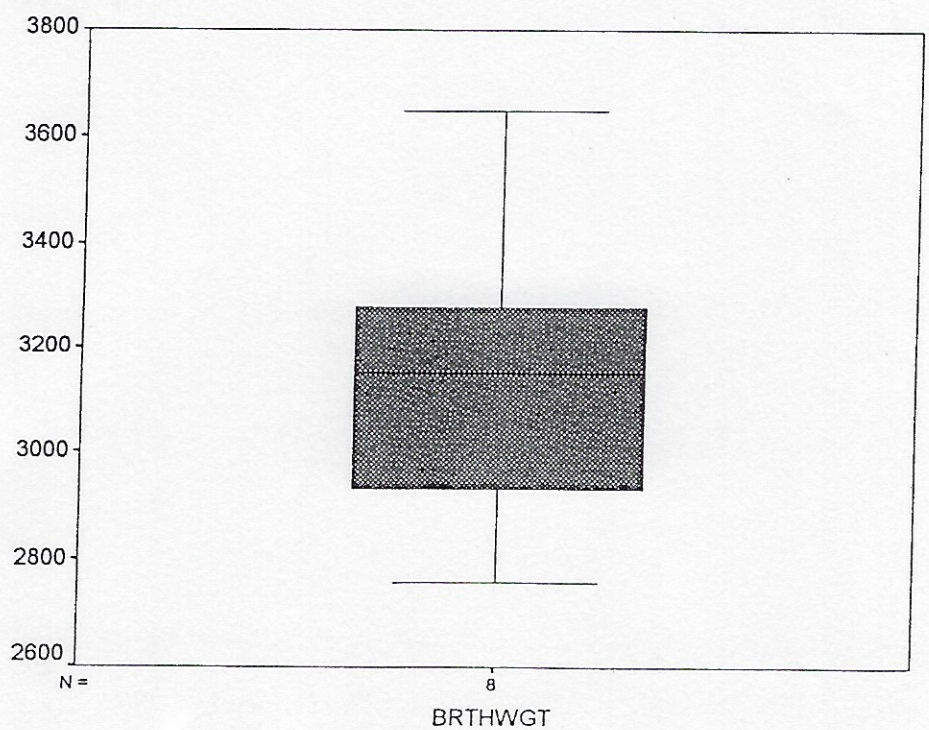
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
BRTHWGT	8	100.0%	0	.0%	8	100.0%

Descriptives

			Statistic	Std. Error
BRTHWGT	Mean		3142.000	99.7128
	95% Confidence Interval for Mean	Lower Bound	2906.217	
		Upper Bound	3377.783	
	5% Trimmed Mean		3135.111	
	Median		3150.500	
	Variance		79541.14	
	Std. Deviation		282.0304	
	Minimum		2759.00	
	Maximum		3649.00	
	Range		890.00	
	Interquartile Range		414.2500	
	Skewness		.424	.752
	Kurtosis		.398	1.481

	brthwgt
1	2759.00
2	2834.00
3	3031.00
4	3101.00
5	3200.00
6	3248.00
7	3314.00
8	3649.00

BRTHWGT



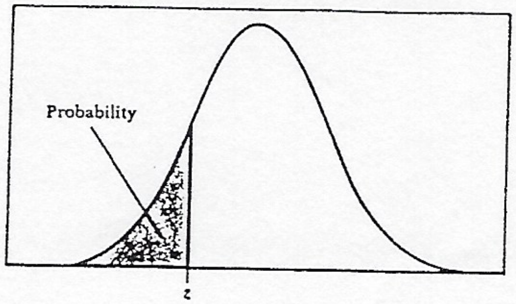


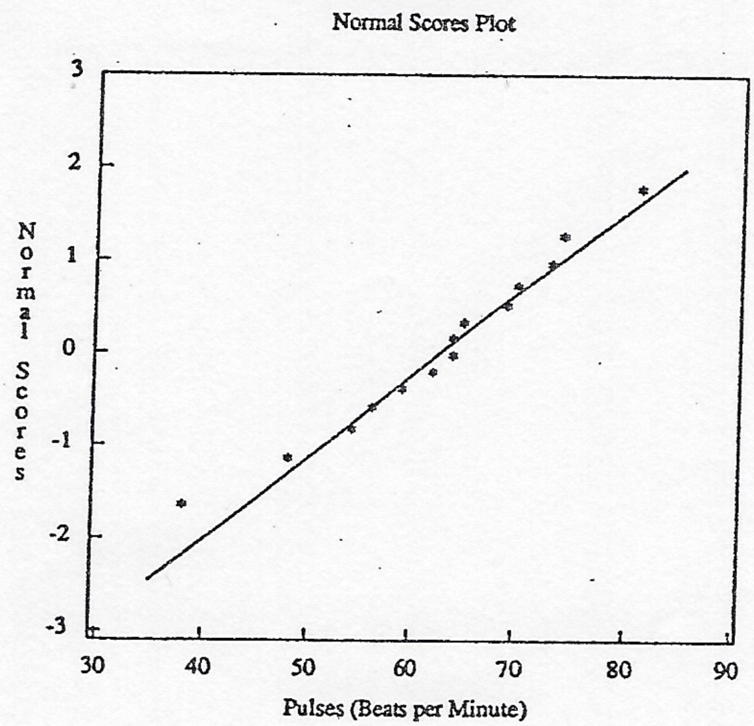
Table entry is probability at or below z.

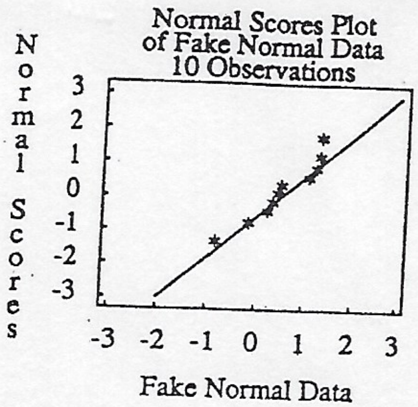
Table A Standard normal probabilities

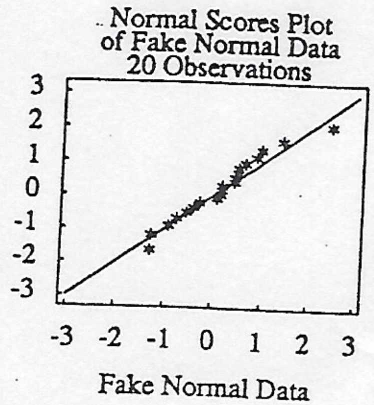
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
−3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
−3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
−3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
−3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
−3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
−2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
−2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
−2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
−2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
−2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
−2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
−2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
−2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
−2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
−2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
−1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
−1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
−1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
−1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
−1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
−1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
−1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
−1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
−1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
−1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
−0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
−0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
−0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
−0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
−0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
−0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
−0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
−0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
−0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
−0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

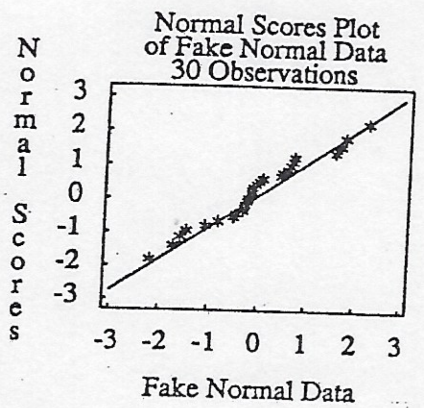
To illustrate the construction of a normal scores plot, consider the following data which represent the pulse rate at rest (in beats per minute) for fourteen men. (Each student measured their own pulse.)

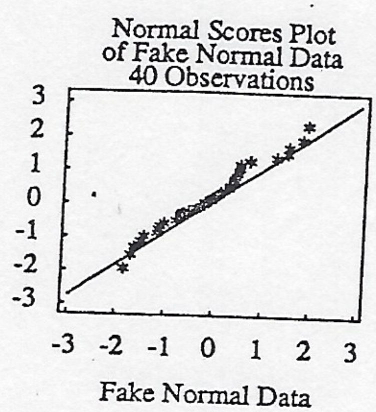
54, 74, 59, 38, 81, 65, 73, 70, 69, 62, 48, 64, 56, 64



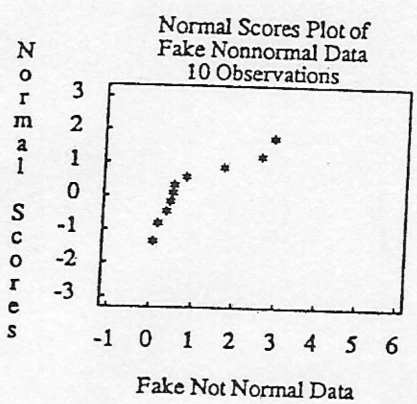


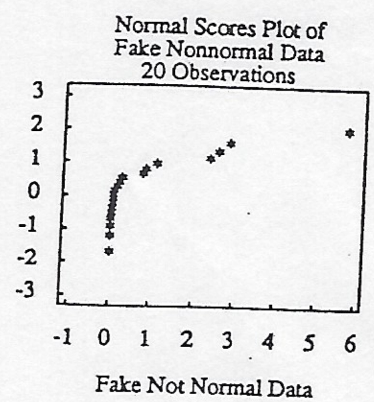


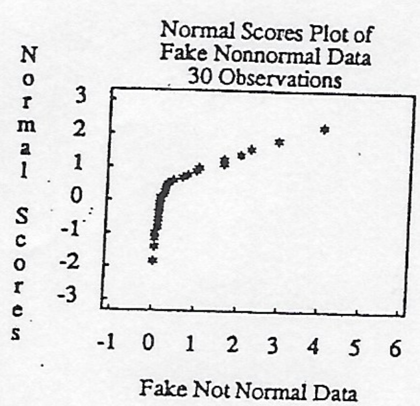


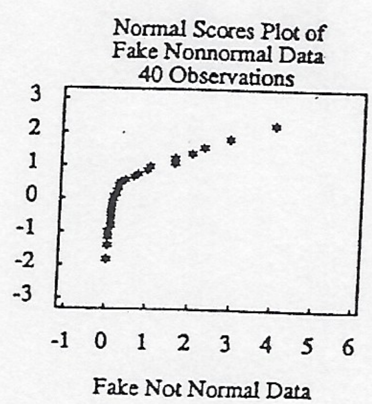


In each of the plots, the scatter *tends* to follow a straight line. Here and there are points which fall off the line, however, there is no *systematic curvature* noted in the plots.

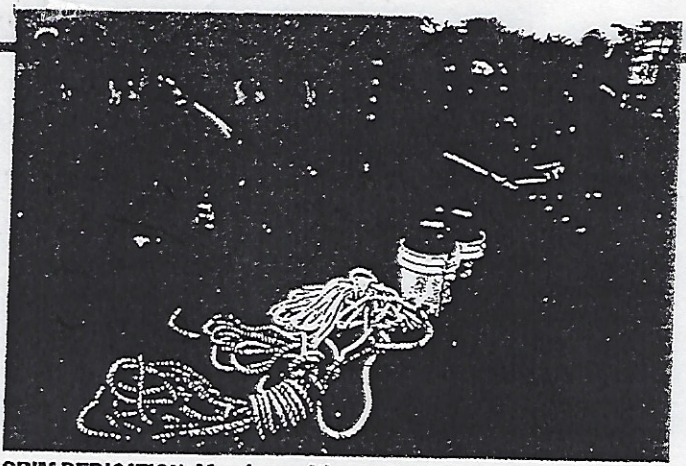








These scatter plots do not follow a straight line. There is *systematic curvature* noted in each of the four plots.



GRIM DEDICATION: Members of the recovery team were overwhelmed by the gruesome job of gathering debris and remains

On the broader safety question, the figures are reassuring. Airline fatalities in the U.S., in proportion to miles flown, have been dropping for decades and lately have stabilized at levels so low that they are difficult even to express as a statistical risk. The National Transportation Safety Board counts 31 fatalities suffered by passengers aboard major U.S. carriers during 1992, which works out to 0.0006 deaths per million aircraft miles flown. Last year that number fell close to an irreducible minimum. As far as major U.S. airlines were concerned, there were no fatalities at all in the air, only one in a ground accident.

Despite the generally excellent U.S. safety record, some critics have long been worried about the effects of the heavy losses suffered by many major carriers in the era of chaotic price wars, mergers and bankruptcies that opened with fare and route deregulation in 1978. Their fear is that more carriers will cut corners on safety in order to save money, for which the now defunct Eastern Airlines was indicted in 1990. USAir is an obvious target for suspicion. It has lost money every year since 1989—$393 million last year, $183 million in the first half of 1994. And it has now suffered two fatal crashes in three months and five in just under five years. Total killed: 232.

USAir executives strongly deny that they are scanting safety. Though the line has announced a huge cost-cutting program and laid off 600 cargo handlers, most of its 8,300 maintenance people and 5,200 pilots have no-cut contracts and have to be kept. So why the crashes? A run of bad luck, says David Shipley, assistant vice president for public relations. "I hate like hell to say it's just chance, because that doesn't sell with the public, but that's what it is." In fact, there does not seem to be much of a common thread to the USAir disasters, and in at least one the line was absolved of responsibility; a 1991 collision between a USAir jet and a commuter plane on a Los Angeles runway that killed 34 people was blamed on air-traffic control. The International Airline Passengers Association classes USAir as one of five lines deserving a B, or "very good," rating for safety. (Five other lines get an honor roll A.)

Outsiders do raise one question about USAir that leads into a more general complaint about federal safety regulation. A safety expert for one of the biggest aircraft makers says that pilot training at USAir is not consistent, because the airline has grown by mergers that "sucked up these feeder airlines, like Piedmont and Pacific Southwest and others, each with a lot of pilots and systems that are different." More broadly, pilots themselves complain that the Federal Aviation Administration lets commuter airlines and air-taxi services get away with lower safety standards. In February testimony to Congress, Randall Babbitt, president of the International Air Line Pilots Association, declared that "the American public would be outraged if we prescribed two different sets of operating rules and safety equipment for automobiles, with the highest standards being reserved for big luxury sedans and a lesser standard imposed on compact cars, but that is exactly what we have in the airline industry."

Critics suggest other ways in which the safety record, good as it is, could be made better. The FAA, they say, should shift its focus from investigating what caused past crashes to identifying problems that could contribute to preventing future accidents. Crashes, they say, are the result of many factors in combination, some of which begin to show up well before they help cause a fatal accident. One possibility is that electronic pulses from laptop computers, compact-disc players and the like used by passengers can interfere with an aircraft's electronic devices. There is no conclusive evidence that they do, but American Airlines and all other major carriers impose restrictions during takeoffs and landings, when 70% or more of accidents occur, just to be safe.

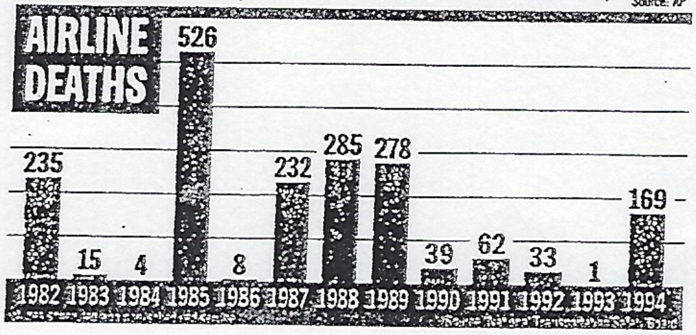
Geraldine Frankoski, director of the Aviation Consumer Action Program, points out what she considers to be a built-in conflict of interest at the FAA that works to the detriment of safety. By law, she notes, the FAA is responsible for fostering and promoting civil aviation, a mandate that includes safeguarding the financial health of airlines, "while also administering and regulating safety. They can't honestly do both."

Maybe not; perhaps the law should be changed to make the FAA stress safety above everything else. Doubtless the airline-safety record, good as it is, could be improved in other ways. But all such discussions keep coming back to a point conceded by some of the sharpest critics: a passenger runs a far greater risk of injury or death getting into a car to drive to an airport than he or she does boarding a plane once there. *—Reported by Jerry Hannifin/Washington and John Moody/New York*

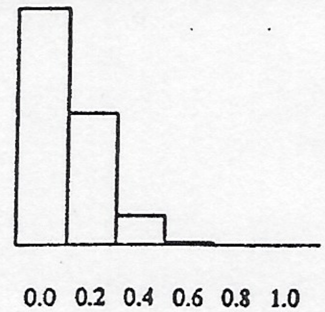
TEN MOST RECENT MAJOR CRASHES

	Airline	Circumstances	Deaths
Sept. 8, 1994	USAir Boeing 737	Crashed on approach to Pittsburgh	132
July 2, 1994	USAir DC-9	Crashed in a thunderstorm near the Charlotte-Douglas International Airport in North Carolina	37
March 22, 1992	USAir Fokker F-28	Crashed on takeoff in a snowstorm at La Guardia Airport in New York	27
March 3, 1991	United Airlines Boeing 737	Lost control and crashed near Colorado Springs airport	25
Feb. 1, 1991	USAir Boeing 737	Collided with a commuter plane on airport runway in Los Angeles	34
Jan. 25, 1990	Avianca Boeing 707	Crashed on approach to JFK airport, on Long Island after running out of fuel	73
Sept. 20, 1989	USAir Boeing 737	Skidded off a La Guardia Airport runway and into the East River	2
July 19, 1989	United Air Lines DC-10	Crashed while attempting an emergency landing at Sioux City, Iowa	112
Aug. 31, 1988	Delta Airlines Boeing 727	Crashed and burned on takeoff at Dallas-Fort Worth airport	14
Dec. 7, 1987	Pacific Southwest BAe 146 jet	Crashed 175 miles northwest of Los Angeles, apparently after a former employee invaded the cockpit	43

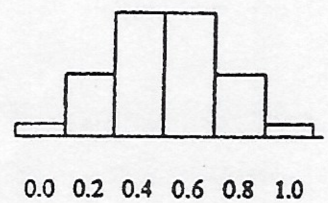
Source: AP



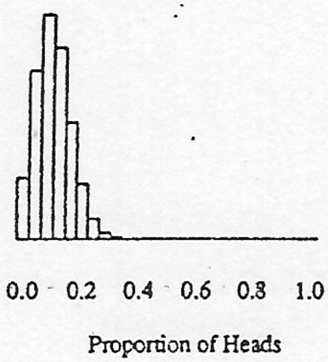
Proportion of Heads
in 5 Tosses of a Coin
p=0.1 (npq=0.45)



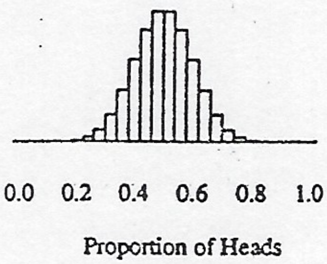
Proportion of Heads
in 5 Tosses of a Coin
p=0.5 (npq=1.25)



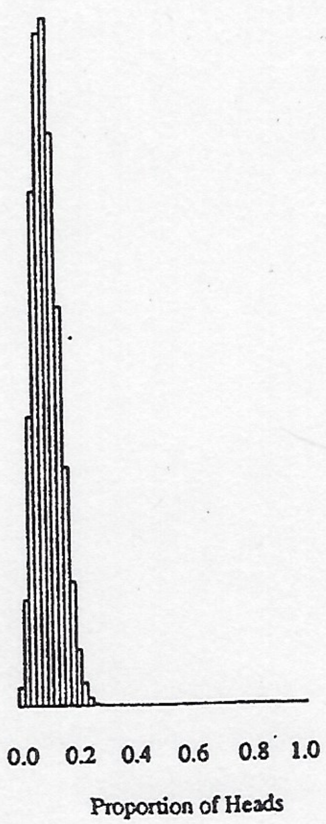
Proportion of Heads
in 25 Tosses of a Coin
p=0.1 (npq=2.25)



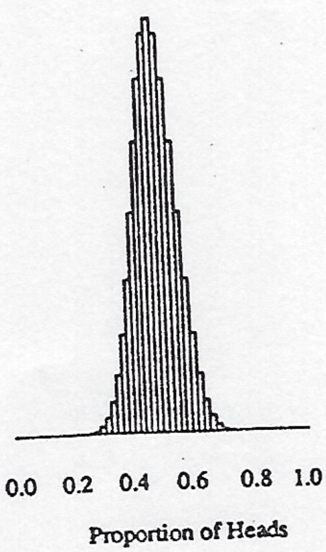
Proportion of Heads
in 25 Tosses of a Coin
p=0.5 (npq=6.25)



Proportion of Heads
in 50 Tosses of a Coin
p=0.1 (npq=4.5)



Proportion of Heads
in 50 Tosses of a Coin
p=0.5 (npq=12.5)

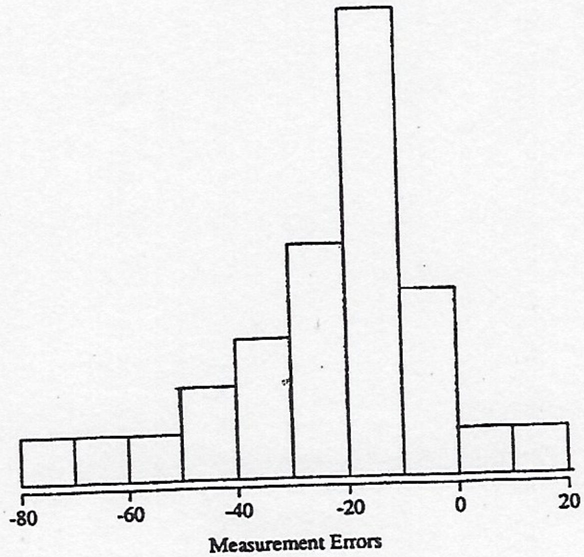


$\bar{x} = -24.24$

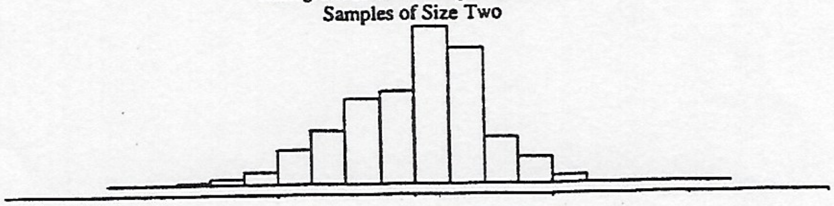
$SD = 19.01$

17, 0, -7, -7, -9, -10, -14. -14, -15, -17, -18, -18, -19, -19, -19, -20, -23, -24, -26, -26, -28, -31, -31, -39, -44, -50, -56, -63, -73

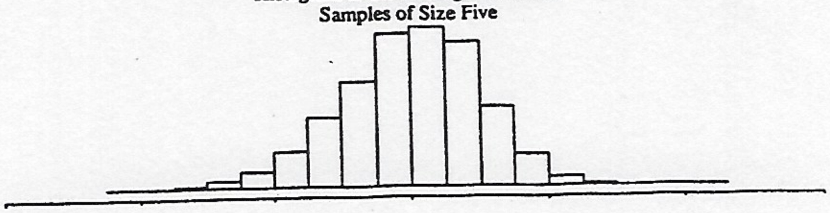
Histogram of the Values on the Tickets in the Hat



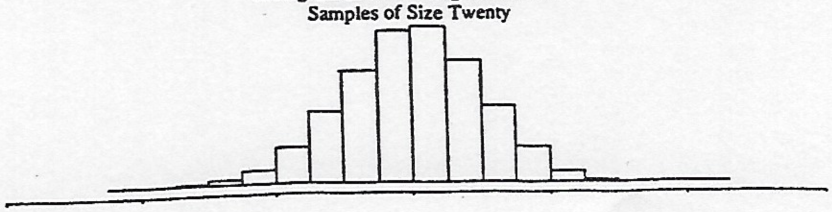
Histogram of the Averages Based on Samples of Size Two



Histogram of the Averages Based on Samples of Size Five



Histogram of the Averages Based on Samples of Size Twenty



4.85 Judy's doctor is concerned that she may suffer from hypokalemia (low potassium in the blood). There is variation both in the actual potassium level and in the blood test that measures the level. Judy's measured potassium level varies according to the normal distribution with $\mu = 3.8$ and $\sigma = .2$. A patient is classified as hypokalemic if the potassium level is below 3.5.

(a) If a single potassium measurement is made, what is the probability that Judy is diagnosed as hypokalemic?

(b) If measurements are made instead on 4 separate days and the mean result is compared with the criterion 3.5, what is the probability that Judy is diagnosed as hypokalemic?

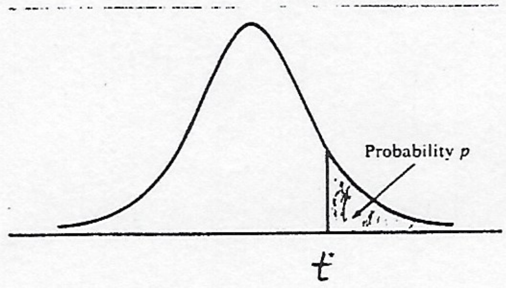
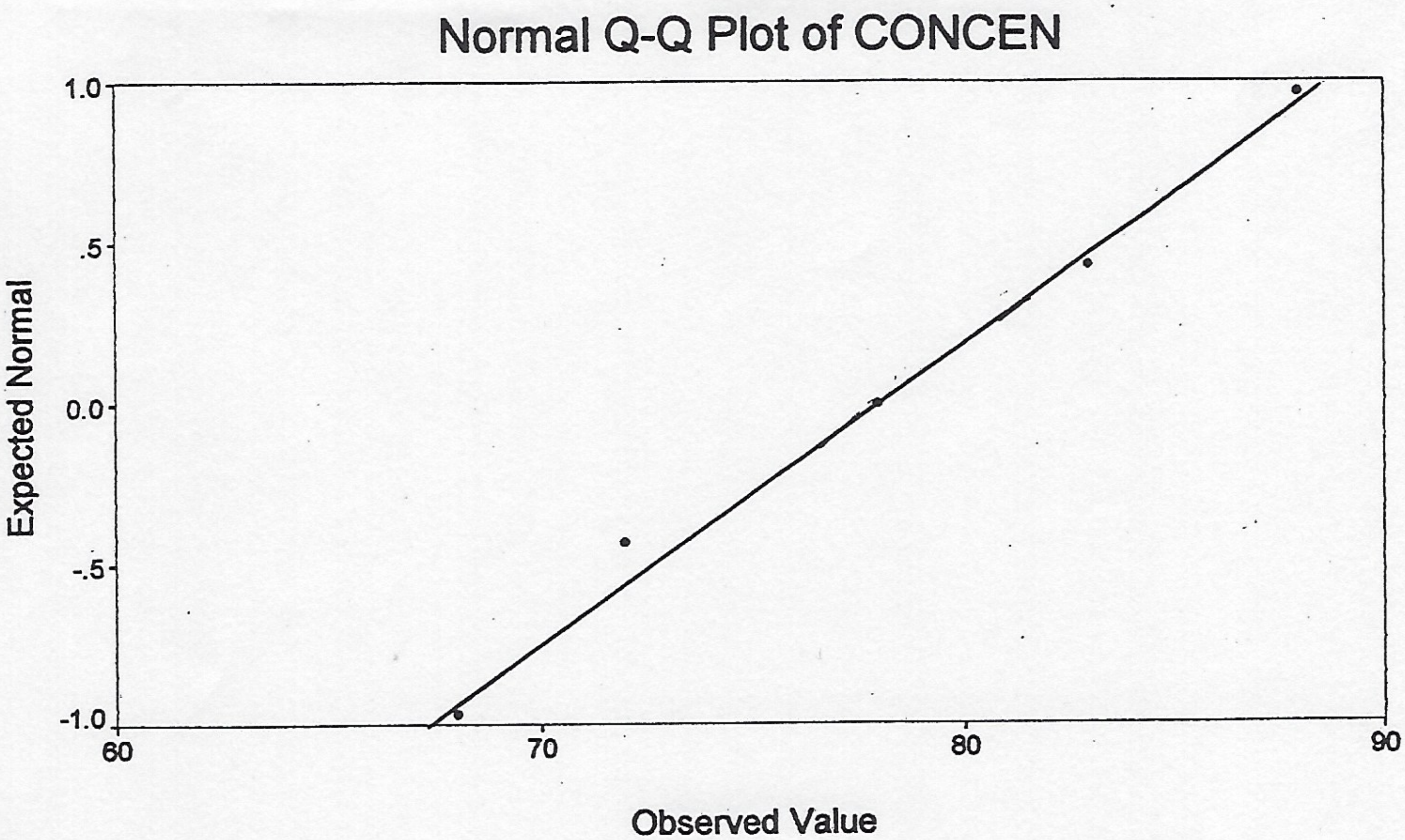


Table entry is the point t^* with given probability p lying above it.

Table E *t distribution critical values*

	Tail probability p											
df	.25	.20	.15	.10	.05	.025	.02	.01	.005	.0025	.001	.0005
1	1.000	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.3	318.3	636.6
2	.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60
3	.765	.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.92
4	.741	.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	.727	.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	.718	.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	.711	.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	.706	.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	.703	.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	.700	.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	.697	.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	.695	.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	.694	.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	.692	.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	.691	.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	.690	.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	.689	.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	.688	.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	.688	.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	.687	.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	.686	.859	1.063	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	.686	.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	.685	.858	1.060	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	.685	.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	.684	.856	1.058	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	.684	.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	.684	.855	1.057	1.314	1.703	2.052	2.158	2.473	2.771	3.057	3.421	3.690
28	.683	.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	.683	.854	1.055	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3.396	3.659
30	.683	.854	1.055	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3.385	3.646
40	.681	.851	1.050	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	.679	.849	1.047	1.299	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	.679	.848	1.045	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	.678	.846	1.043	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	.677	.845	1.042	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3.174	3.390
1000	.675	.842	1.037	1.282	1.646	1.962	2.056	2.330	2.581	2.813	3.098	3.300
∞	.674	.841	1.036	1.282	1.645	1.960	2.054	2.326	2.576	2.807	3.091	3.291
	50%	60%	70%	80%	90%	95%	96%	98%	99%	99.5%	99.8%	99.9%
	Confidence level C											



USE NORMAL Q-Q PLOT TO GET ↑

STATISTICS ⇒ COMPARE MEANS ⇒ ONE-SAMPLE T
(SET TEST VALUE = 70)

Page 1

One Sample t-tests

Variable	Number of Cases	Mean	SD	SE of Mean
CONCEN	5	77.8000	8.075	3.611

Test Value = 70

Mean Difference	95% CI Lower	95% CI Upper	t-value	df	2-Tail Sig
7.80	-2.226	17.826	2.16	4	.097

11

DONALD GRIFFIN, 88

Discovered bats' 'echolocation'

Los Angeles Times

Donald Griffin, a zoologist who solved the mystery of how bats navigate in the dark and later transformed the study of animal behavior by suggesting animals were intelligent, died Nov. 7 at his home in Lexington, Mass. He was 88.

Mr. Griffin made his breakthrough on bat sonar in 1938 while an undergraduate at Harvard University.

Working with fellow student Robert Galambos, he used special microphones to prove that bats navigate in the dark by emitting ultrasonic sounds and then listening for the echoes.

Mr. Griffin later coined the widely used term "echolocation" for the process.

The pesticide DDT causes tremors and convulsions if it is ingested by humans or other mammals. Researchers seek to understand how the convulsions are caused. In a randomized comparative experiment, 6 white rats poisoned with DDT were compared with a control group of 6 unpoisoned rats. Electrical measurements of nerve activity are the main clue to the nature of DDT poisoning. When a nerve is stimulated, its electrical response shows a sharp spike followed by a much smaller second spike. Researchers found that the second spike is larger in rats fed DDT than in normal rats. This observation helps biologists understand how DDT causes tremors.[10]

The researchers measured the amplitude of the second spike as a percentage of the first spike when a nerve in the rat's leg was stimulated. For the poisoned rats the results were

12.207 16.869 25.050 22.429 8.456 20.589

The control group data were

11.074 9.686 12.064 9.351 8.182 6.642

Normal quantile plots (Figure 7.8) show no evidence of outliers or strong skewness. Both populations are reasonably normal, as far as can be judged from six observations. The difference in means is quite large, but in such small samples the sample mean is highly variable. A significance test can help confirm that we are seeing a real effect. Because the researchers did not conjecture in advance that the size of the second spike would increase in rats fed DDT, we test

$$H_0: \mu_1 = \mu_2$$
$$H_a: \mu_1 \neq \mu_2$$

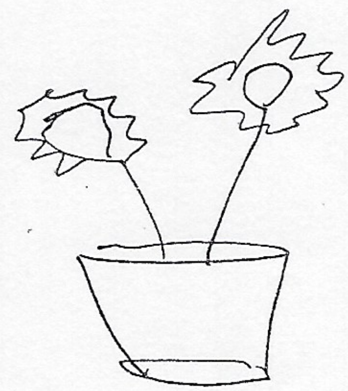
Here is the output from the SAS statistical software system for these data:[11]

```
                              TTEST PROCEDURE
Variable: SPIKE

GROUP      N          Mean          Std Dev        Std Error
-------------------------------------------------------------
DDT        6    17.60000000      6.34014839       2.58835474
CONTROL    6     9.49983333      1.95005932       0.79610839

Variances        T        DF      Prob>|T|
-------------------------------------------
Unequal     2.9912       5.9        0.0247
Equal       2.9912      10.0        0.0135
```

SAS reports the results of two t procedures, the general two-sample procedure ("Unequal" variances) and a special procedure that assumes the two population variances are equal (see next section). We are interested in the first of these procedures. The two-sample t statistic has the value $t = 2.9912$, the degrees of freedom from Equation 7.4 are df $= 5.9$, and the P-value from the $t(5.9)$ distribution is 0.0247. There is good evidence that the mean size of the secondary spike is larger in rats fed DDT.

Charles Darwin, M.A., F.R.S., *ETC*, in his book *The Effects of Cross and Self Fertilisation in the Vegetable Kingdom* (Appleton, 1902), examines the advantages of cross-fertilization in plants. In particular, he presents a long series of experiments with various plants to examine the benefits of cross-fertilization. The following data represent the heights of *Zea mays* (corn) plants, in inches, as reported in Darwin's book:

Crossed	*Self-fert*
23.5	17.375
12.0	20.375
21.0	20.0
22.0	20.0
19.125	18.375
21.5	18.625
22.125	18.625
20.375	15.25
18.25	16.5
21.625	18.0
23.25	16.25
21.0	18.0
22.125	12.75
23.0	15.5
12.0	18.0



d_1	d_2	d_3	d_4	d_5	d_6	d_7	d_8	d_9	d_{10}	d_{11}	d_{12}	d_{13}	d_{14}	d_{15}
6.125	-8.375	1.000	2.000	0.750	2.875	3.500	5.125	1.750	3.625	7.000	3.000	9.375	7.500	-6.000

For these numbers, $\bar{d}$ is equal to 2.616 inches, while SD_d is equal to 4.718 inches. In this way, the test statistic is given by

$$\frac{\bar{d}}{\frac{SD_d}{\sqrt{N}}} = \frac{2.616}{\frac{4.718}{\sqrt{15}}} = 2.148.$$

14

How much of our personality, our likes and dislikes, our individuality, is predetermined by our genes? And which of our traits are shaped and changed by our environment? Twins, because they share an identical genotype, make ideal subjects for investigating the degree to which various environmental conditions may instigate change. The classical method of studying this phenomenon and the subject of an interesting book by Susan Farber (1981) is the study of identical twins separated early in life and reared apart.*

Identical twins, genetically called *monozygotic (MZ) twins*, are formed when a single egg, fertilized by a single sperm, splits into two parts and each develops into a separate embryo. In contrast, fraternal twins, or *dizygotic (DZ) twins*, develop when two eggs are released from one or both ovaries and each is fertilized by a different sperm. Although they have been the subjects in many studies of twins, DZ twins are no more genetically similar than two siblings. Therefore, a study of DZ twins would leave unanswered the question of whether a given individual trait is due to hereditary or environmental differences. Likewise, MZ twins reared in the same family share almost identical environments and make it difficult to separate the two factors. Thus, claims Farber, "in theory at least, the clearest demarcation of heredity and environment is found when identical twins have been separated early in life and reared apart in different homes, by different parents, and often in widely varying socioeconomic and geographic circumstances."

Over the years, several studies of MZ twins have been conducted. Farber's book contains a chronicle and reanalysis of 95 pairs of identical twins reared apart. Much of her discussion focuses on a comparison of IQ scores; in this case study we will apply the matched-pairs technique of Section 8.6 to her data.

The question of concern is, "Are there significant differences between the IQ scores of identical twins, where one member of the pair is reared by the natural parents and the other member of the pair is not?" The data for this analysis (extracted from Table E6 of Farber's book) appear in Table 8.11. One member (A) of each of the $n = 32$ pairs of twins was reared by a natural parent, whereas the other member (B) was reared by a relative or some other person.

TABLE 8.11
IQ Scores of Identical Twins Reared Apart

PAIR ID	TWIN A	TWIN B	PAIR ID	TWIN A	TWIN B
112	113	109	228	100	88
114	94	100	232	100	104
126	99	86	236	93	84
132	77	80	306	99	95
136	81	95	308	109	98
148	91	106	312	95	100
170	111	117	314	75	86
172	104	107	324	104	103
174	85	85	328	73	78
180	66	84	330	88	99
184	111	125	338	92	111
186	51	66	342	108	110
202	109	108	344	88	83
216	122	121	350	90	82
218	97	98	352	79	76
220	82	94	416	97	98

a. Explain why the data should be analyzed as matched pairs.
b. Compute the difference between IQ scores within each of the $n = 32$ pairs by subtracting the score for twin B from the score for twin A.
c. Construct a 95% confidence interval for the mean difference in IQ scores, $\mu_d = (\mu_A - \mu_B)$.
d. Based on the interval constructed in part c, is there evidence of a difference in mean IQ scores between twins reared by a natural parent and twins reared by a relative or some other person? Explain.
e. What assumptions are necessary for the validity of the confidence interval ...

*Adapted from *Identical Twins Reared Apart*, by Susan L. Farber.

How the Poll Was Conducted

The latest New York Times/CBS News poll is based on telephone interviews conducted Oct. 25 through Oct. 29 with 1,439 adults throughout the United States. Of these, 1,308 said they were registered to vote.

The sample of land-line telephone exchanges called was randomly selected by a computer from a complete list of more than 42,000 active residential exchanges across the country. The exchanges were chosen so as to ensure that each region of the country was represented in proportion to its population. Within each exchange, random digits were added to form a complete telephone number, thus permitting access to listed and unlisted numbers alike. Within each household, one adult was designated by a random procedure to be the respondent for the survey.

To increase coverage, this land-line sample was supplemented by respondents reached through random dialing of cellphone numbers. The two samples were then combined.

Some findings regarding voting were also weighted in terms of an overall "probable electorate," which uses responses to questions dealing with voting history, attention to the campaign and likelihood of voting in 2008 as a measure of the probability of respondents' turning out in November.

In theory, in 19 cases out of 20, overall results based on such samples will differ by no more than three percentage points in either direction from what would have been obtained by seeking to interview all American adults. For smaller subgroups, the margin of sampling error is larger. Shifts in results between polls over time also have a larger sampling error.

In addition to sampling error, the practical difficulties of conducting any survey of public opinion may introduce other sources of error into the poll. Variation in the wording and order of questions, for example, may lead to somewhat different results. In projecting final pre-election polls such as this, events that happen after the interviewing and before Election Day may also affect the outcome.

Complete questions and results are available at

nytimes.com/polls

In a recent year, 73% of first-year college students responding to a national survey identified "being very well-off financially" as an important personal goal. A state university finds that 132 of an SRS of 200 of its first-year students say that this goal is important.

(a) Give a 95% confidence interval for the proportion of all first-year students at the university who would identify being well-off as an important personal goal.

(b) Is there good evidence that the proportion of first-year students at this university who think being very well-off is important differs from the national value, 73%? (Be sure to state hypotheses, give the *P*-value, and state your conclusion.)

The 1958 Detroit Area Study was an important investigation of the influence of religion on everyday life. The sample "was basically a simple random sample of the population of the metropolitan area" of Detroit, Michigan. Of the 656 respondents, 267 were white Protestants and 230 were white Catholics.

The study took place at the height of the cold war. One question asked if the right of free speech included the right to make speeches in favor of communism. Of the 267 white Protestants, 104 said "Yes," while 75 of the 230 white Catholics said "Yes."[7]

a. Is there a diff in attitudes between Protestants + Catholics?

b. Give a 95% confidence interval for the difference between the proportion of Protestants who agreed that communist speeches are protected and the proportion of Catholics who held this opinion.