AP STATS 4.20–24

4.20 explanatory: consumption of herbal tea
response: cheerfulness
Lurking variable: social interaction — many nursing home residents may have been lonely before the students started visiting.

4.21 The r would be smaller because there is more variation among individuals than the averages reported.

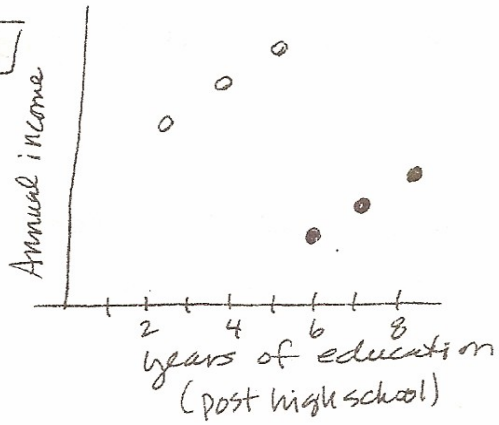
4.22 Seriousness of the fire is the lurking variable. More serious fires require more firefighters.

4.23 Age is the lurking variable. Older students have larger shoe sizes and read better.

4.24 No. You can't shorten a hospital stay by choosing a small hospital. It seems more likely that patients with more serious conditions (which require longer hospital stays) would choose a larger hospital because they are more likely to have the facilities to treat those problems.

AP Stats 4.26 - 32

4.26



If economists in business are open circles and teaching economists are filled circles, we see a positive correlation for each group taken separately but a negative one taken together.

4.27 explanatory: whether or not a student has taken at least two years of a foreign language.

response: score on the test

Lurking variable: students' English skills before the foreign language study. Students who are good in English are usually advised to take a foreign language. Students who are not very good in English may be advised not to take a foreign language.

4.28 Social status of parents could be a lurking variable. Families with more money can afford to subsidize more education. They may also have connections to help their children get better jobs or money to help children go into business for themselves.

4.29 Drivers are larger and heavier than conductors and so are more likely to have health problems such as heart disease.

4.30 sum 73026. Round off error accounts for the difference.

4.31 total in the study = 166438

% 25-34 $\frac{41388}{166438} = .2487$ **24.9%**

35-54 $\frac{73028}{166438} = .4388$ **43.9%**

55+ $\frac{52022}{166438} = .3126$ **31.3%**

4.32 a)

	Smokes	doesn't	
both	400	1380	1780
one	416	1823	2239
neither	188	1168	1356
	1004	4371	**5375** students in the study

b) % who smoke $\frac{1004}{5375} = .18679$ **18.7%**

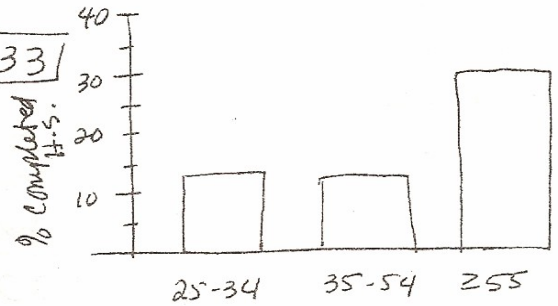
c) Both parents smoke 1780 $\frac{1780}{5375} = .3312$
33.1%

One parent smokes 2239 $\frac{2239}{5375} = .4166$
41.7%

Neither parent smokes 1356 $\frac{1356}{5375} = .2523$
25.2%

AP Stats 4.33 - 39

4.33



25-34 $\frac{5325}{41388} = .12866$

35-54 $\frac{9152}{73028} = .12532$

55+ $\frac{16035}{52022} = .30823$

The percentage who finished H.S. is about the same for 25-34 and 35-54 but more than double for 55+.

4.34

55+ $\frac{16035}{52022} = .3082$ 30.8%

$\frac{18320}{52022} = .3522$ 35.2%

$\frac{9662}{52022} = .1857$ 18.6%

$\frac{8005}{52022} = .1539$ 15.4%

4.35

35-54

$\frac{9152}{73028} = .1253$ 12.5%

$\frac{24070}{73028} = .3296$ 33%

$\frac{19926}{73028} = .2729$ 27.3%

$\frac{19878}{73028} = .2722$ 27.2%

This is more like the 25-34 group.

4.36 4 or more years of college:

25-34 $\frac{10342}{38225} = .2706$ 27%

35-54 $\frac{19878}{38225} = .5200$ 52%

55+ $\frac{8005}{38225} = .2094$ 21%

4.37

			total
	30	20	50
	30	20	50
total	60	40	100

	10	40	50
	50	0	50
	60	40	100

4.38

	died	survived	
low	21	2655	2676
high	55	3283	3338
	76	5938	6014

total

a) $\frac{76}{6014} = .0126$ 1.26% died

b) Blood pressure is explanatory

c) Low BP $\frac{21}{2676} = .75\%$ died

4.39

	Smokes	Doesn't	total
Both	400	1380	1780
One	416	1823	2239
Neither	188	1168	1356
total	1004	4371	5375

a) $\frac{\text{Students who smoke}}{\text{2 parents smoke}} = \frac{400}{1780} = .2247$

Students Smoke if both parents: **22.5%**

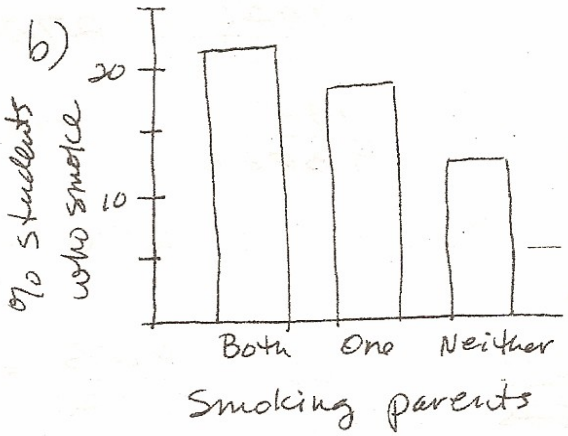
$\frac{\text{smoke}}{\text{1 parent}} = \frac{416}{2239} = .1858$

one parent: **18.6%**

$\frac{\text{smoke}}{\text{neither}} = \frac{188}{1356} = .1386$

neither: **13.9%**

b)



c) Children of smokers are more likely to smoke. If both parents smoke, students are the most likely to smoke.

AP Stats 4.40 – 48

4.40 a)

	admit	deny	
male	490	210	700
female	280	220	500
	770	430	1200

b) males admitted $490/700 = .70$
females admitted $280/500 = .56$

c) business males admitted $480/600 = .80$
females admitted $180/200 = .90$
law males admitted $10/100 = .10$
females admitted $100/300 = .33$

d) 600 of 700 males who applied to the college chose the business school which admits 83% of its applicants. 300 of 500 females who applied chose the law school which admits only 27.5% of its applicants.

4.41

death →	yes	no	
White defendant	19	141	160
Black defendant	17	149	166
	36	290	326

death penalty whites $\frac{19}{160} = \boxed{11.9\%}$ blacks $\frac{17}{166} = \boxed{10.2\%}$

black victims " $\frac{0}{9} = \boxed{0\%}$ " $\frac{6}{103} = \boxed{5.8\%}$

white victims " $\frac{19}{151} = \boxed{12.6\%}$ " $\frac{11}{63} = \boxed{17.5\%}$

c) 14% of defendants received the death penalty when the victim was white. Only 5.4% were sentenced to death if the victim was black. White defendants usually kill white victims ($\frac{151}{160} = 94.4\%$) but are less likely to get the death penalty than blacks who kill whites.

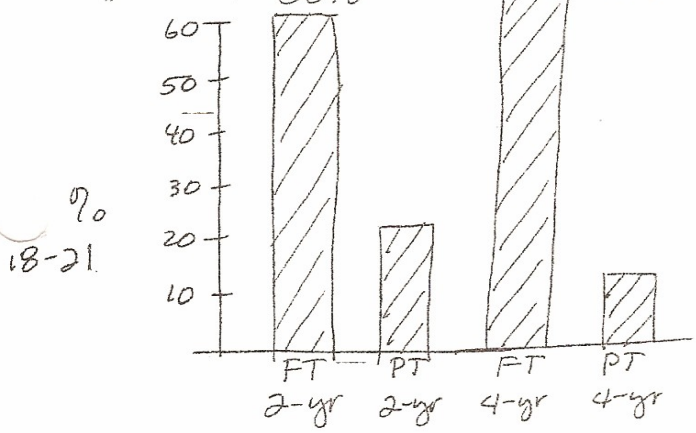
4.42 a) 704 thousand (704000) b) 2065 thousand (2,065,000)

c) There is some round off error.

4.43 a) $2212 + 2065 + 5657 + 1440 = 11374$ thousand = **11,374,000**

b) $\frac{1345 + 456 + 3869 + 159}{11374} =$ **51.25%**

c) $\frac{1345}{2212} = .608$ $\frac{456}{2065} = .221$ $\frac{3869}{5657} = .684$ $\frac{159}{1440} = .110$



d) The 18-21 group makes up more than 66% of full-time students. (5214/7869) but only 17.5% of part-time students. (615/3505)

4.44 a) $\frac{704}{2065} = .3409$ **34.1%** b) $\frac{704}{1907} = .3692$ **36.9%**

4.45

	2FT	2PT	4FT	4PT		a) age	b) 2yr PT
15-17	44	4	79	0	127	1.1%	0.19%
18-21	1345	456	3869	159	5829	51.2%	22.1%
22-29	489	690	1358	494	3031	26.6%	33.4%
30-44	287	704	289	627	1907	16.8%	34.1%
≥45	49	209	62	160	480	4.2%	10.1%
	2214	2063	5657	1440	11374		

c) The biggest difference between (a) and (b) is the lower percentage of 18-21 yearolds in 2yr PT Colleges and the higher percentage in the higher age groups.

4.46

	Restrained	Unrestrained	
injured	197	3844	4041
uninjured	1749	21181	22930
	1946	25025	26971

a) % restrained $\frac{1946}{26971} = .072$

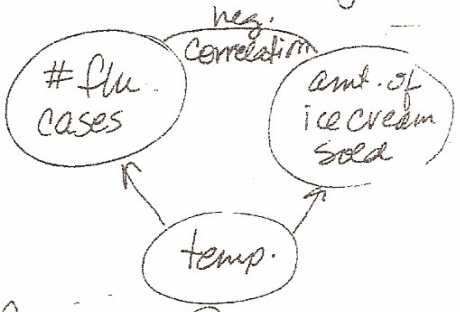
7.2%

b) % of restrained who were injured $\frac{197}{1946} = .1012$

% of unrestrained who were injured $\frac{3844}{25025} = .1536$

The data shows that 10.1% of children who were restrained were injured and 15.4% of unrestrained children were injured.

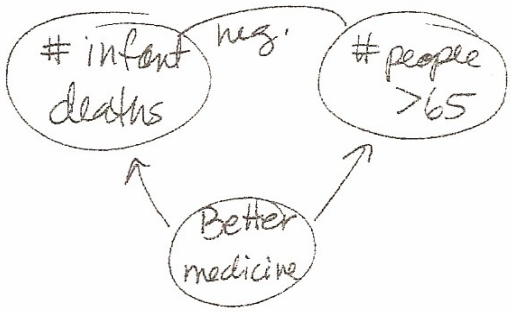
4.47



Common Response

During times of colder temperature the number of flu cases usually goes up and the demand for ice cream goes down. In summer flu cases go down and ice cream consumption goes up.

4.48



Common Response

Both variables, infant deaths and # people over 65 respond to the variable of better medical care. Better care lowers # of infant deaths and increases lifespan and, therefore, number of people over 65.

stats 4.62-67

4.62

	Aspirin	Placebo
fatal heart attacks	10	26
other heart attacks	129	213
strokes	119	98
	11037	11034

$\frac{139}{11037} = .0126$ 1.26% in the aspirin group had heart attacks. (.09% fatal, 1.17% non-fatal)

$\frac{119}{11037} = .0108$ 1.08% had strokes

$\frac{239}{11034} = .0217$ 2.7% of placebo group had heart attacks (.2% fatal, 1.9% non-fatal)

$\frac{98}{11034} = .0089$ .89% had strokes

The aspirin group had a slight advantage regarding heart attacks. (2.7% of placebo group vs. 1.26% of aspirin group had heart attacks.) On the other hand, those in the aspirin group had a slightly higher incidence of stroke. (1.08% of aspirin group vs. .89% of placebo group had strokes.)

This is actually an <u>experiment</u> not a study. A cause-and-effect relationship does seem to be indicated. The results, though, may apply only to healthy, male doctors over 40. The same outcomes might not be observed for persons who already have heart problems, or for women, or for patients under age 40.

4.63

	male	female	
firearms	16285	2600	
poison	3221	2203	
hanging	3688	756	
other	1530	623	
	24724	6182	30906

total men: $\frac{24724}{30906} = .79997$

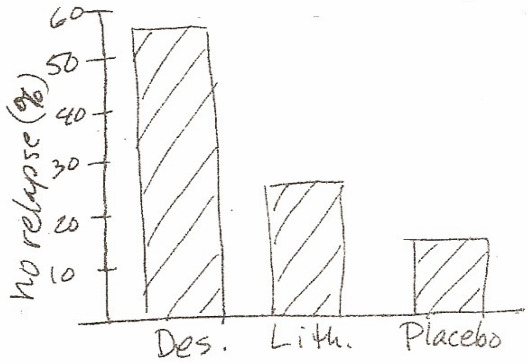
fire arms: $\frac{16285}{24724} = .6587$ $\quad \frac{2600}{6182} = .4206$

poison: $\frac{3221}{24724} = .1303$ $\quad \frac{2203}{6182} = .3564$

80% of suicide victims were men. Firearms were the most common method for both sexes. (65.9% for men, 42.1% for women). Poison was the second most common method for women (35.6%). Compared with only 13.0% for men. In the last two categories the percentages are pretty close.

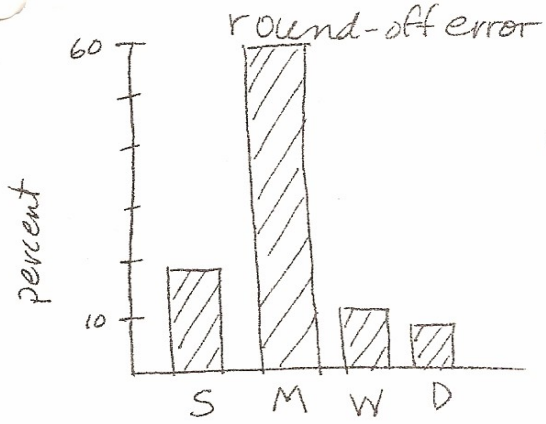
4.64

	Relapse	No		Success (no relapse)	
Desipramine	10	14	24 →	$\frac{14}{24} = .5833$	58.3%
Lithium	18	6	24 →	$\frac{6}{24} = .25$	25%
Placebo	20	4	24 →	$\frac{4}{24} = .1667$	16.7%
	48	24	72		



b) Since the addicts were randomly assigned to treatment groups, we can tentatively assume causation. We need to know more about the study before we reach that conclusion.

4.65 a) total 18-24
12625



b) Single **19.4%** $\frac{18541}{95833} = .1935$ Married **59.3%** $\frac{56838}{95833} = .5931$

Widowed **11.8%** $\frac{11290}{95833} = .1178$ Divorced **9.6%** $\frac{9161}{95833} = .0956$

c) 18-24 Single $\frac{9008}{12627} = .7134$ married $\frac{3352}{12627} = .2655$

Widowed $8/12627 = .0006$ Divorced $257/12627 = .0204$

40-64 $\frac{1975}{33762} = .0585$ $\frac{24462}{33762} = .7245$

$\frac{2570}{33762} = .0761$ $\frac{4755}{33762} = .1408$

The largest portion of 18-24 year olds are single (71%) while the largest portion of 40-64 year olds are married (72%) Only about 6% of older women are still single.

d) Single women 18541 18-24 $\frac{9008}{18541} = .486$ 25-39 $\frac{6658}{18541} = .359$

40-64 $\frac{1975}{18541} = .107$ ≥65 $\frac{900}{18541} = .049$

4.66 Apparently women are more likely to be in fields which pay less overall (to both men and women). For example, if many women and few men have job A which pays $40,000 per year, and if few women and many men have job B which pays $50,000 per year, lumping them all together leads to an incorrect perception of unfairness.

4.67

	Smoker		Non-Smoker	
	Overweight?		Overweight?	
Early death	Yes	No	Yes	No
Yes	1	4	3	1
No	0	2	6	3
	7		13	

total overweight 10

smokers, die early $5/7 = .71$

non-sm. " " $4/13 = .31$

overwt. " " $4/10 = .40$

non overwt " " $5/10 = .50$