10
Good

Cathy Sun
AP Stats – 4
9/5/13
Mr. Micek

Historical Notes on Statistics

1. In the beginning, statistics involved _____.
   It involved summarizing data by means of charts and tables

2. What did the Chinese use stats for? How long ago?
   They used it for keeping state records in 2000 B.C, which is 4000 years ago. They maintained records of revenue collection, government expenditure, and availability of warriors.

3. Who began the study of statistics?
   John Graunt began the study the statistics with his book, *Natural and Political Observations Upon the Bills of Mortality.*

4. Why wasn't statistical theory commonly used prior to 1930? What changed?
   The accumulation and analysis of statistical data was too time consuming and involved complicated computations. Things changed after the invention of the computer because it could do long and difficult calculations in a relatively short amount of time.

5. What is inference?
   Inference is making generalizations on the basis of samples.

6. Where are the origins of the study of probability found?
   The origins of probability are found in Cardan's book *The Book on Games of Chance.*

7. Who wrote the 1st book on the theory of randomness? What was the title?
   Girolomo Cardan wrote *The Book on Games of Chance.*

Cathy Sun
9/11/13
Stats P4

1.1 # 1-3, 5, 7, 9

1 a) responses about how frequent surveyers eat at fast-food restaurants
b) qualitative
c) responses about fast-food restaurants from all us adults

2 a) miles per gallon
b) quantitative
c) mpg of all new 2003 cars

3 a) student fees at colleges/universities
b) quantitative
c) student fees of all colleges/universities in nation

5. a) time interval between receipt and check clearance
b) quantitative
c) time interval between receipt and check clearance in 5 state region

7 a) ratio
b) interval
c) nominal
d) ordinal
e) ratio
f) ratio

9 a) nominal
b) ratio
c) interval
d) ordinal
e) ratio
f) interval

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stats P4

Gertrude's situation

Gertrude wants to find out the most popular type of phone that AT&T users have. she goes into the database and uses a random computer generator to choose 200 customers. The population is the type of phone of the customers, and the sample consists of 200 people. After randomly selecting her sample, Gertrude goes through and finds out that the most popular phone choice is an iPhone 5. She therefore concludes that most AT&T customers prefer iPhones.

cathy sun
9/14/13
P4 - stats

Planning a study 5.26-5.28

5.26 This is not an experiment because no treatments or groups are imposed; the subjects self-declare their votes. NO explanatory or response variables because it's not an experiment.

5.27 a) the 20 pieces of package liner
b) the temperature; 4 levels (250°F, 275°F, 300°F, 325°F)
c) the force needed to peel each seal

5.28 a) Yes, the educator imposes a treatment (different curriculums) on the students to observe a response.
b) explanatory variable is the computer reading software
c) response variable is the change or increase in reading ability

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9/15/13
P4-stats

1.3 # 2b-d, 3-6

2b) experiment
c) simulation
d) sampling
3a) sampling
b) simulation
c) census
d) experiment
4a) NO, "over the last three years" is a more precise phrase
b) Yes, if "Have you ever run a stop sign" was asked, many of those who respond yes would oppose the doubling of fines
c) Many would say no because they don't want to seem lazy. Also, they self-dictate what is too much TV. Rarely, sometimes, and frequently are better responses because there are ~~distinct~~ differences among the three levels.
5a) Randomly pick 10 calves to get vaccinated out test all calves; no placebo
b) Randomly pick 9 schools to send police officer to but survey all schools; no placebo
c) Randomly pick 40 volunteers to get real patch, other 35 get no drugs on patch. survey all subjects; yes placebo
6a) Randomly choose 25 cars to have new temperature-bond tires. Examine all tires after 35000 miles. Double-blind experiment used.
b) Randomly choose 10 bags to carry weapons. Monitor and observe all bags with a security camera. Double-blind exp not used because agent knows if there is a weapon in the bag.
c) Randomly pick 35 people to get new eyedrops. Measure eye pressure of all patients. Double-blind exp used.

cathy sun

10-

1.2 # 5, 6, 10-13

5. a) I would assign each healthy subject a number 01 through 40. Then I would use the random number table; the first subject assigned to the 1st randomly selected # will be in group 1, and the second subject chosen will be in group 2. The subjects would be sorted so forth.

b) Do the same in part a except only number 01-22.

c) number the two healthy groups 1 and 2, name the two sick groups 3 and 4. If the # from the RNT is odd, then group 1 will be in the first group. For the sick groups, if the # is odd, then group 3 will be in the first group.

6 T is odd 8 6 7 3 5 3 5 5 6 1 7 6 6 4 9 1 8 2 1 7 6 3 4 4 6

H is even H H T T T T T H T T H H H T T H H T T H T H H H

10 a) assign the headsets #001-500. Use RNT to pick 6 three digit numbers. 496, 351, 383, 115, 456, 242 will be inspected.

b) There are 240 minutes between 8 and 12, so pick 10 times at which to inspect a shirt. From the RNT, get 10 3 digit numbers from 001-240. Min 113, 140, 154, 171, 126, 43, 119, 87, 100, 64

c) use RNT to pick 9 5-digit numbers between 21942 and 98756. Radios 37818, 72142, 67140, 50785, 53362, 44940, 60430, 22834, and 96593 will be inspected.

d) Assign the cartons numbers 001-800 and pick 12 3 digit numbers from RNT. 594, 68, 84, 675, 530, 140, 634, 795, 139, 255, 887, 716 will be checked. going → toss 807+

11. a) Label sheep 001 to 250 and choose 15 3-digit numbers in this range. sheep 43, 111, 247, 70, 8, 72, 239, 204, 193, 7, 101, 88, 46, 189, 90 will be checked

b) Pick 10 4 digit numbers from 1024-8342. 4045, 6892, 6848, 5624, 2103, 0278, 1739, 2056, 2977, 2678 will be looked out.

c) Pick 5 numbers from 01-25 minutes. Luggages at min 21, 03, 19, 16, and 23 will be checked

a) choouse 12 two digit numbers from RNT that fall between 01-60. Adults at min 36, 13, 38, 27, 58, 42, 52, 60, 53, 45, 08, and 18 will be surveyed.

12. even=true, odd=false 9 3 7 1 2 5 1 2 8 7 0 5 7 5 4 7 9 3 9 6

F F F F T F F T T F T F F F T F F F F T

Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20

14 falses, 6 trues

13. Choose 10 numbers in the interval 1-5, repeats are OK.

4 3 1 2 2 1 1 5 4 4

D C A B B A A E D D

Cathy Sun
1/22/13

5.39 a) there is no control group and Fizz will not know if responses are due to the medication or other factors

b) Divide the 60 patients into three groups. one will get Fizz's medication, one will get an aspirin, and one will get a placebo. Then make sure the patients and doctors do not know who is getting what. An hour later, ask all patients how much pain relief they experienced.

c) NO. If a patient knows they are getting a placebo, their mind will not think the body is getting better and the patient is aware that no reaction or difference should occur. If the patient does not know, then everybody thinks they have a chance of healing, and the mind responds positively.

d) Yes it should be double-blind also because then the doctors will treat each patient the same, showing no favorability or extra care towards those who get the pain relief medication. Otherwise, the patients will figure out who has or has not been given the medication based on the doctor's behavior.

5.40 a)

①		②		③		④	
Wilansky	42	Brown	34	Loren	32	Smith	29
Nevesky	39	Cruz	34	Brunk	30	Mann	28
Birnbaum	35	Jackson	33	Obrach	30	Kendall	28
Tran	35	Stall	33	Rodriguez	30	Santiago	27

⑤	
Hernandez	25
Moses	25
Deng	24
Williams	22

b) I dropped an eraser and started counting to the right. First I am looking for a # 1-5 to pick a block. The first number in the interval that I come across is # 4. →

Now in block 4, I need to assign weight loss treatments. Now I'm looking for a number 1-8. First person is 1&5 second is 2&6 third is 3&7 fourth is 4&8. Each time, the first number picked will refer to who gets A, the second will refer to who gets B, third with C, and fourth with D. My number is 1, so Smith gets A. Then 8, so Santigo gets B, then 2 so Mann gets C, and lastly, Kendall gets D. Repeat with other blocks.

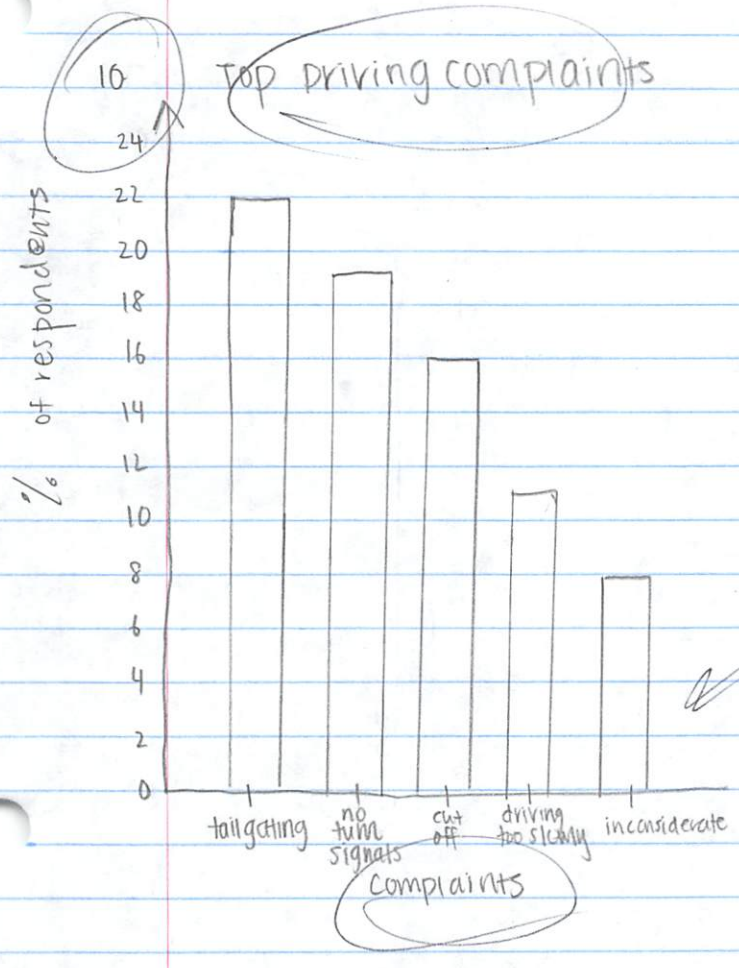
I got the #1, so I work with block 1 next. I draw 8, 6, 7, 1. Tran gets A, Nevesky gets B, Bimbaum gets C, Wilansky gets A.

Next number 3 → Block 3. I draw 5, 4, 3, 6. Loren gets A, Rodriguez gets B, Obrach gets C, Brink gets D.

Next number 2 → Block 2. I draw 7, 1, 6, 8. Jackson gets A, Brown gets B, Cruz gets C, Stall gets D

One block left, #5. I draw 2, 7, 1, 4. Moses gets A, Deng gets B, Hernandez gets C, Williams gets D.

5.42 Each person will exert force with the right and left hand. To determine which hand will use the scale first, we will flip a coin. Heads mean right hand goes first; Tails mean left hand goes first. Do this with all 10 subjects.



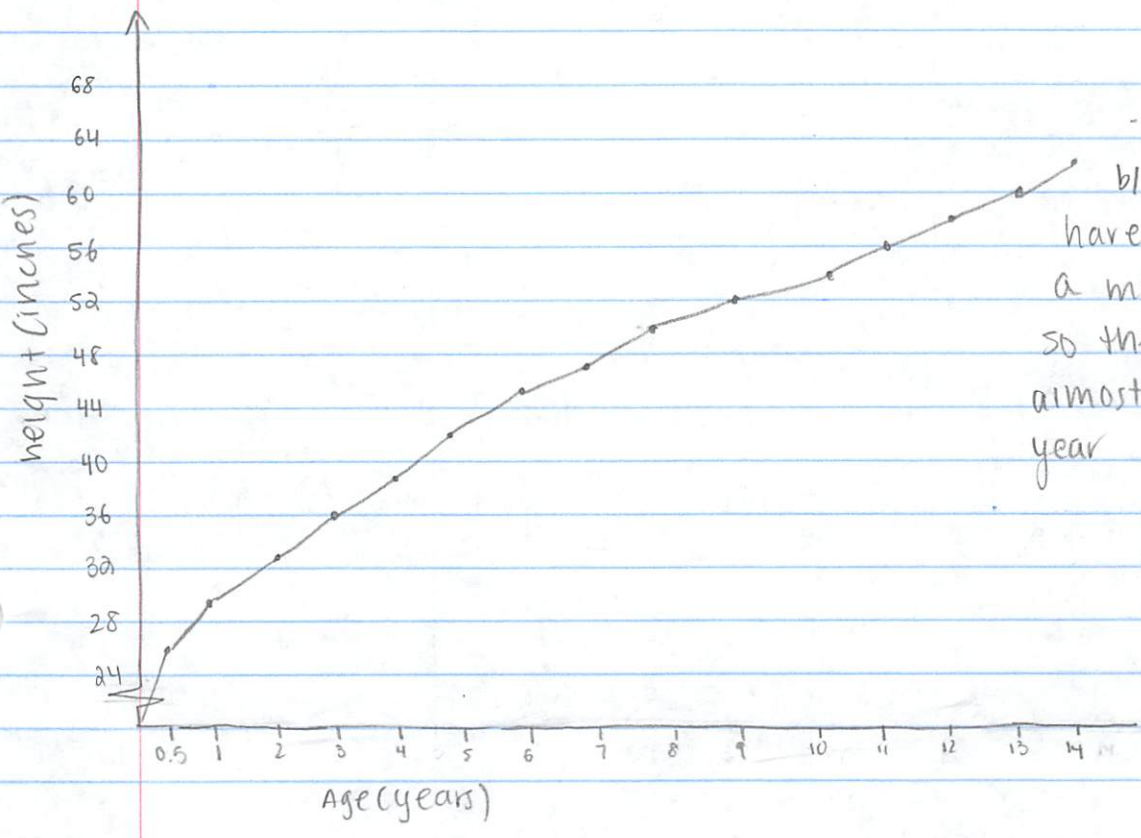
Analysis

top driving complaints are the ones that cause greatest anxiety and have the greatest potential for accidents — why?

why lowest?

* cannot be a pie chart b/c %'s don't add up to 100

"other" section??



Analysis

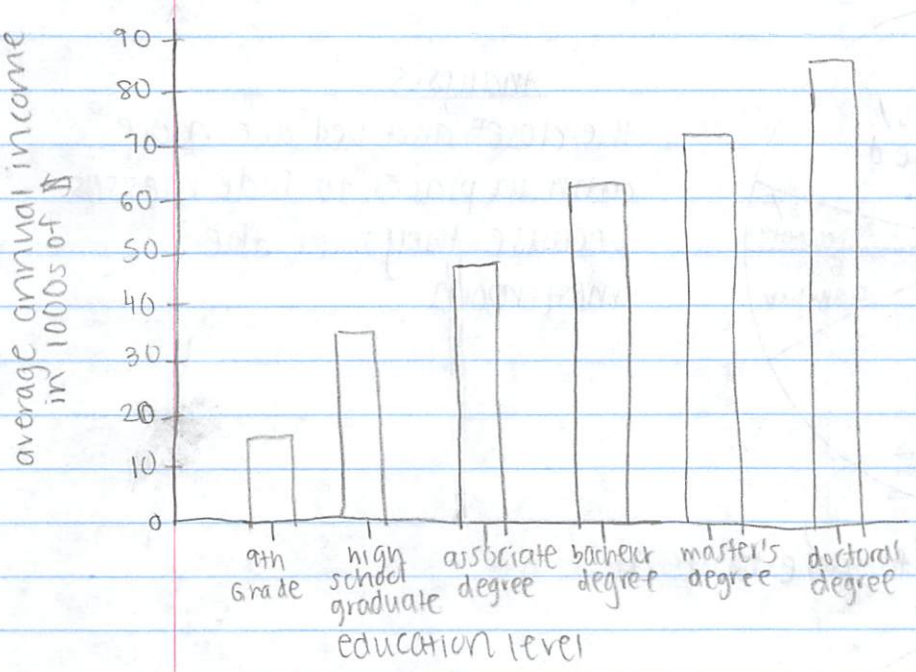
- linear relationship b/c until 14, boys haven't gone through a major growth spurt so their heights increase almost the same each year

Cathy Sun
10/1/13

10-

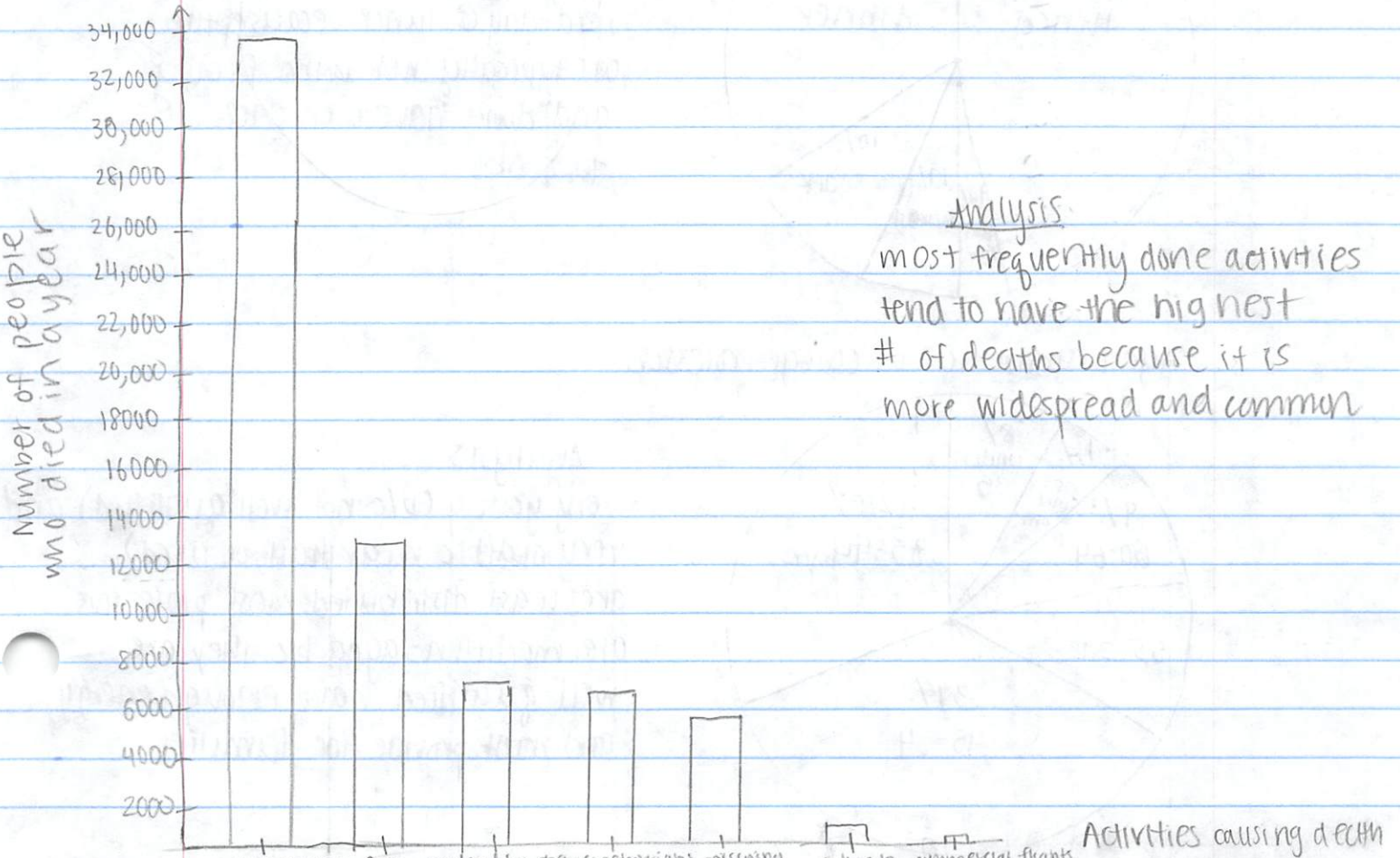
2.1 # 1, 3, 5, 6, 8, 10, 12

1) Household income for education levels



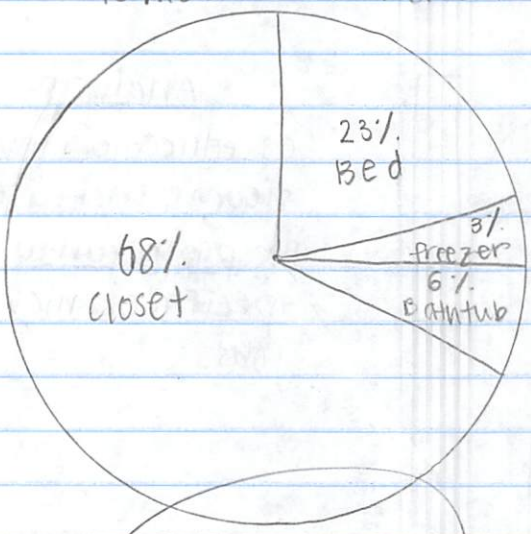
Analysis
as education level increases, income increases because the people can take more specific or higher quality jobs

3) Activities causing death



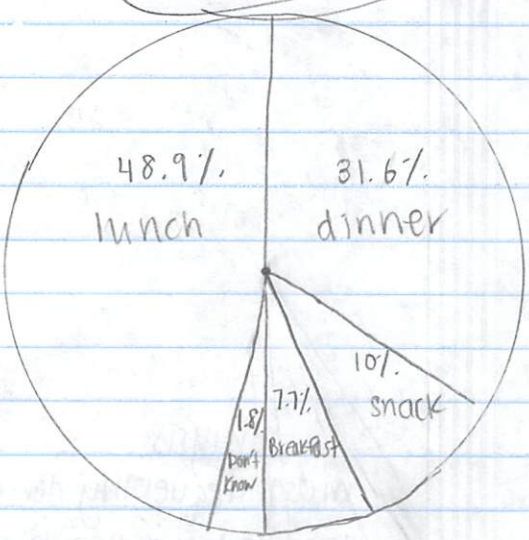
Analysis
most frequently done activities tend to have the highest # of deaths because it is more widespread and common

5. Places to hide a mess when a guest is present



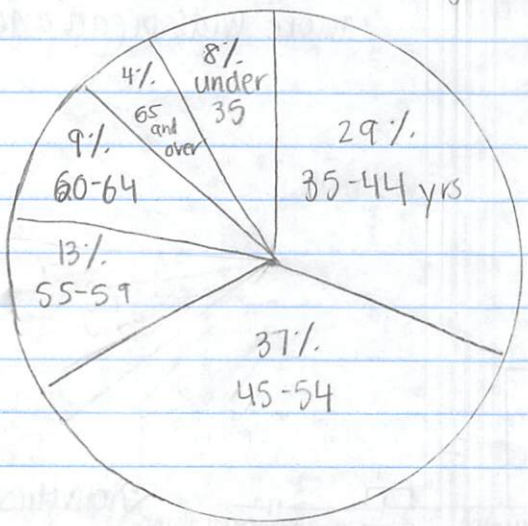
Analysis
the closet and bed are more common places to hide messes because they offer the most room

6. Meals to eat in a fast-food restaurant



Analysis
people tend to eat fast-food mid-day @ lunch because they are typically not with family and don't have a chance to cook

8. Age distribution of college professors



Analysis
- very young (b/c not well-qualified) and very old (b/c weak, frail, or tired) are least distributed. Most professors are medium-aged b/c they are well-qualified, have enough energy, and must provide for families

cathy sun
Kyra Stevens

10

1. on a scale of 1-10 with 1 being absolutely not and 10 being absolutely yes, will there be more terrorist attacks on American soil?

1 2 3 4 5 6 7 8 9 10

2. How often do you and your parents regularly discuss the news?

0 1 2 3 4 5 6 7 8 9 10 >10

0 times a week — >10 times a week

3. Do you favor or oppose high schools offering daily current events classes?

1 2 3 4 5 6 7 8 9 10

oppose — favor

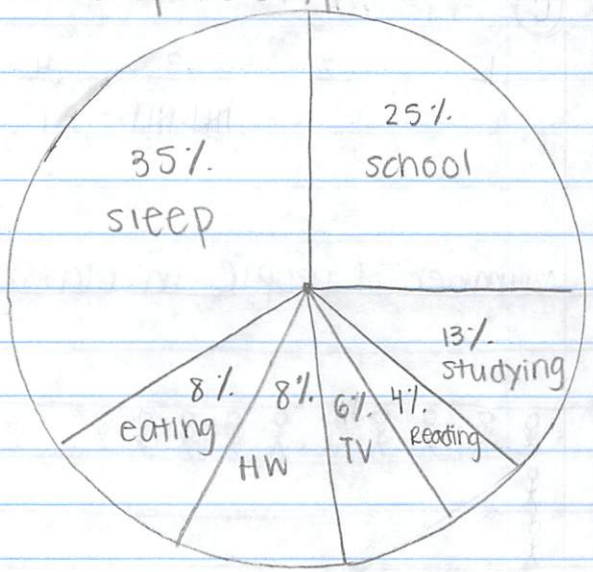
Cathy Sun

Math Lab

(A)

25%	6 hours of school
8%	2 hours of eating
6%	1.5 hours of watching TV
35%	8.5 hours of sleeping
8%	2 hours of homework
13%	3 hours of studying
4%	1 hour of Reading

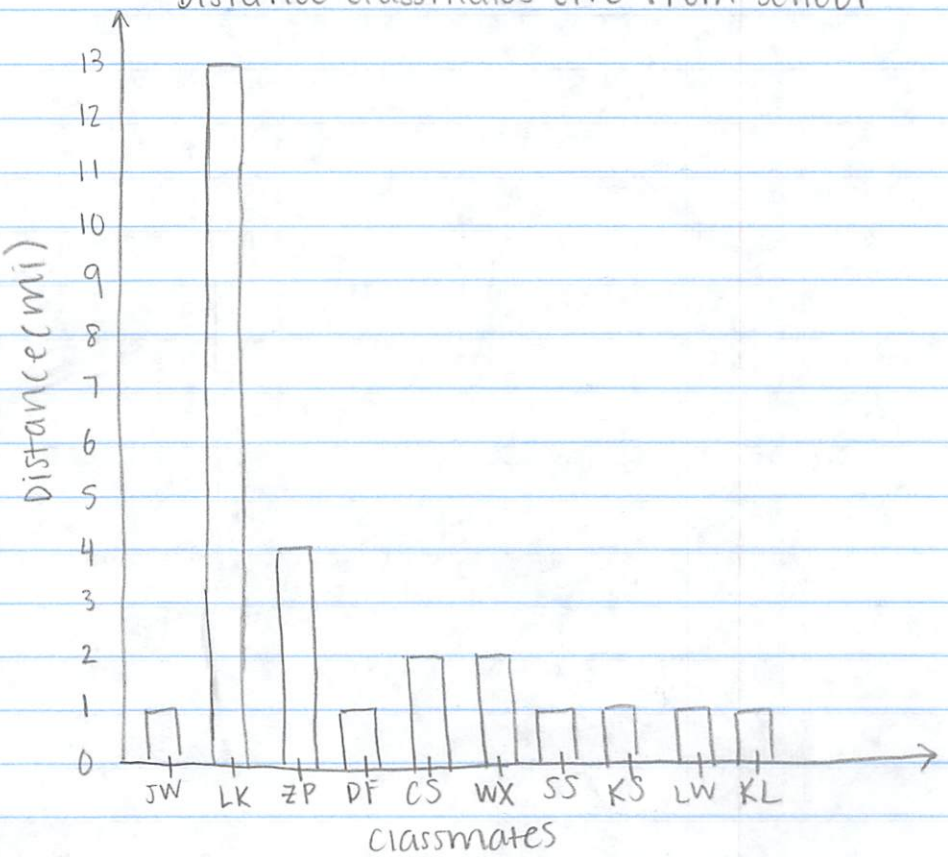
How I spend a Typical Schoolday



(B)

JW	Jessica	1 mi
LK	Leah K.	13 mi
ZP	Zainab	4 mi
DF	Dorinda	1 mi
CS	Catherine	2 mi
WX	Wendy	2 mi
SS	Shivani	1 mi
KS	Kyra	1 mi
LW	Leah W.	1 mi
KL	Kuenhee	1 mi

Distance classmates Live from school

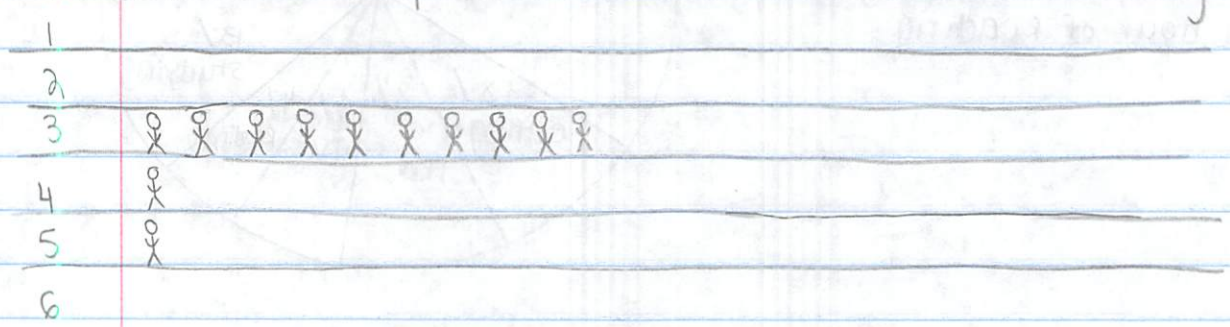


Analysis: A majority lives close to the school b/c going to OPHS is convenient. For LK, the reputation of the school is incentive for attendance.

(C)

1	2	3	4	5	6
		𝍸 𝍸	1	1	

Number of people in classmates' Immediate family



key 🧍 = 1 student

(1,365,41)

- 310,203,308,59,161,87,339,146,265,301,15,80,225,185,86,326,36,321,61,239,251,25,175,161,104,120,147,144,168,83,33,318,31,234,169,290,329,37,291,165,319
- 293,178,233,91,249,254,243,239,25,153,287,178,182,75,5,328,154,164,198,245,246,35,134,160,300,223,213,238,104,247,230,92,268,337,232,252,99,217,65,275,20
- 291,274,129,74,277,165,59,110,186,153,293,337,49,148,347,259,51,62,67,119,212,308,50,103,49,317,276,348,188,265,101,29,226,160,323,181,326,265,180,74,14
- 151,42,353,195,291,101,43,247,32,290,184,62,81,167,294,202,181,274,257,96,67,342,152,314,62,351,34,130,347,96,115,216,94,220,351,124,253,94,111,160,348

2/4 = 50%.

5.66 a) Responses from residents in the Province of Ontario. Responses from 61,239 Ontario residents are the sample.

b) No, perhaps those who didn't respond are those with lower income and their opinions / data are not represented.

5.67 a) explanatory: breast cancer treatment
response: survival times after treatment

b) the researcher does not impose a treatment; he merely observes the effects and information

c) aspects like different health, exercises, diet, stress, and severity of the cancer can all affect different survival times

5.68 Yes, because a treatment (the psychological test) is imposed on the two groups. However, there is no control group to compare the results to.

5.69 a) Number students 1-3478 and use RNT to find 100 #s from 0001-3478. send a questionaire to the students with the designated labeled numbers

b) students # 2940, 769, 1481, 2975, 1315.

5.61

Assumption:

- no twins, non-leap year, independent - equally likely

randint(1, 365, 23) which represents dates. Look for doubles.

↳ sto→L, Stat 2: SortA(L,1)

Rep 1 = N

Rep 2 = Y

Rep 3 = N

Rep 4 = Y

Rep 5 = Y

Rep 6 = Y

Rep 7 = N

$15/27 \approx 56\%$

8 = Y

9 = Y

10 = N

11 = N

12 = Y

13 = N

14 = N

15 = N

16 = N

17 = Y

18 = Y

19 = Y

20 = Y

21 = Y

22 = Y

23 = N

24 = Y

25 = Y

26 = N

27 = N

Cathy Sun

Simulation Packet

5.56 a) First, randomly choose 10 students to question and ask them "Do you favor or oppose abolishing evening exams." I would then repeat it many times to see the likelihood that 100% of 10 favor to abolish.

b) 0-7 = yes 8-9 = NO

c)

3675958984	68288822913	1863854303	00795087 27
YYYYNYNNNY	YNYNNYYNYY	YNYYNYYYYY	YYYNYYNYYY
6905164817	8717409517	8453406489	8720197245
YNYYYYYNYY	NYYYNNYNYY	NYYYYYYYNN	NYYYYNYYYY
0500716632	8119414873	0419785576	4519596565
*YYYYYYYYY	NYYNYYYNYY	YYYNYNYYYY	YYYNYNYYYY
6873255259	8429208796	4316593739	3168597150
YNYYYYYYYN	NYYNYYNYNY	YYYYYNYYYN	YYYNYNYYYY
4574041807	6556133302	0705193623	1813209547
YYYYYYYNYY	*YYYYYYYYYY	YYYYYNYYYY	YNYYYYNYYY
2781678416	1832921337	3521337741	0431268508
YYNYYYNYYY	YNYYNYYYYY	*YYYYYYYYYY	YYYYYYNYYN
6692555658			
YYNYYYYYYN			

3/25 = 12%.

5.57 a) Assign numbers 1-7 to mean she makes it, and assign 8, 9, 0 to be a miss. Then use RNT to get 5 numbers and associate it with a make or miss. 7/10 digits = 70% make of her free throw shots.

b)

96746	12149	37823	71868	18442	35119	62103	39244	96927	19931
NYYYY	YYYYN	YYNYY	YYNYN	YNYYY	YYYYN	YYYYY	YNYYY	NYNYY	YNNYY
*36809	74192	77567	88741	*48409	41903	*43909	99477	25330	64359
YYNNN	YYYNY	YYYYY	NNYYY	YNYNN	YYNNY	YYNNN	NNYYY	YYYYN	YYYYN
*40085	16925	85117	36071	15689	14227	06565	14374	13352	49367
YNNNY	YYNYY	NYYYY	YYNYY	YYYNN	YYYYY	NYYYY	YYYYY	YYYYY	YNYYY
*81982	87209	36759	58984	68288	22913	18638	54303	00195	08727
NYNNY	NYYNN	YYYYN	YNNNY	YNYNN	YYNYY	YNYYN	YYYNY	NNYNY	NNYYY
69051	64817	87174	09517	84534	06489	87201	97245	05007	16632
YNNYY	YYNYY	NYYYY	NNYYY	NYYYY	NYYNN	NYYNY	NYYYY	NYNNY	YYYYY

11/50 = 22%.

5.60 a) use TI-84 to choose 20 numbers between 1 and 100. rand(1, 100, 20). All numbers from 1-32 chosen means a hit, from 33-100 means a miss. Repeat 20 times.

b) H H H H H M H H M H M M H M H M M H M M H
29 12 12 12 13 54 24 9 46 25 94 53 28 83 26 86 72 2 85 36 23 = 12/20

M H H M H H M H M M M M M H M M M M M M
81 15 1 100 11 8 52 5 83 95 72 93 61 15 100 57 66 78 75 98 = 6/20

M M H M M M M H M M M H M H M M H H M M
83 99 9 42 90 51 36 29 93 52 82 10 90 3 90 97 18 4 64 43 = 6/20

H H M H M M M H H M M M H M M H M M H H M
26 24 68 20 43 100 17 23 69 5 36 8 87 72 28 42 78 22 4 57 = 9/20

H M M M M H M M H H M M M M M H M M H M
1 33 67 90 66 6 39 46 26 16 90 89 60 53 74 35 66 54 10 99 = 6/20

M M M H M M M M H M M M H M M M M M M M
56 38 90 28 43 91 69 47 15 95 84 53 10 80 80 39 85 37 86 86 = 3/20

M M M H M M H M H M M M M M M H M H M
70 92 65 16 91 47 11 44 11 42 69 63 39 33 38 25 59 55 28 70 = 5/20

M M M H M M M M H M M H M M H M M H M
42 49 57 28 40 48 87 90 29 47 69 28 67 69 29 38 37 86 13 62 = 5/20

91 25 20 44 78 10 24 8 37 85 47 82 80 38 2 40 28 31 67 64 = 7/20

58 70 20 81 32 50 41 74 63 63 68 38 46 53 53 55 82 54 67 86 = 2/20

9 35 82 70 80 67 74 2 88 25 82 38 1 38 19 12 37 81 89 31 = 7/20

68 34 94 30 39 74 96 1 41 89 51 62 3 13 8 89 94 41 36 33 = 5/20

86 33 22 47 38 89 22 25 18 69 59 48 99 26 38 25 51 66 70 57 = 6/20

21 10 53 80 24 56 92 74 4 58 73 20 61 17 67 84 1 36 93 8 = 8/20

68 80 49 77 86 99 30 40 91 65 58 62 89 38 30 18 76 72 31 34 = 4/20

82 60 51 76 61 64 34 52 99 25 23 93 1 83 84 82 68 50 71 27 = 4/20

78 99 42 11 50 31 32 32 72 91 2 15 91 4 58 95 43 40 71 79 = 6/20

52 16 7 80 44 2 53 12 82 71 28 38 90 96 79 87 93 58 90 63 = 5/20

46 81 16 98 50 3 34 62 12 27 78 48 95 25 47 10 1 53 81 2 = 7/20

80 11 81 19 38 19 43 45 70 70 93 36 46 52 50 78 31 5 72 76 = 4/20

c) 117/400 = 0.293, which is slightly less than 0.320

5.61 use calc to generate 23 numbers from 1-365 and run 8 simulations

57 152 29 85 255 23 217 314 305 309 210 250 252 167 204 212 287 256 24 92 260 295

261, 243, 39, 196, 277, 39, 338, (209), 157, 142, 206, 358, 62, 226, 302, 148, (209), 119, 110, 51, 284, 236, 230

19, 47, 107, (128), 124, 282, 17, 96, 98, 241, (128), 274, 55, 125, 207, (131), 114, (131), 121, 98, 254, 211, 76

168, 223, 195, 61, 64, 123, 5, 321, 188, 271, 121, 350, 253, 198, 191, 348, 86, 279, 125, 18, 141, 144,

194, 352, 34, 10, 118, 322, 239, 321, 244, 118, 27, 348, 125, 221, 339, 343, 289, 364, 56, 210, 89, 147, 96

51, 190, 255, 275, 167, 340, 141, 272, 173, 83, 335, 318, 20, 26, 284, 119, 251, 321, 349, 195, 49, 268, 191

103, 289, 77, 55, 90, 157, 175, 26, 31, 262, 113, 163, 335, 87, 198, 49, 36, 76, 45, 8, 140, 310, 4

340, 15, 71, 155, 75, 183, (1), 190, 286, 302, 248, 242, 269, 340, 3, (1), 183, 212, 290, 86, 310, 177, 120

(on last page)

3/8 = 38%

cathy sun

Ch1 RVW 6-8

6a) cluster
b) convenience
c) systematic
d) simple random
e) stratified

7a) observational, no treatment from the researcher was imposed and the population self-assigns age
b) experiment, the treatment is a multiple choice or essay exam and the results of the 2 groups are compared

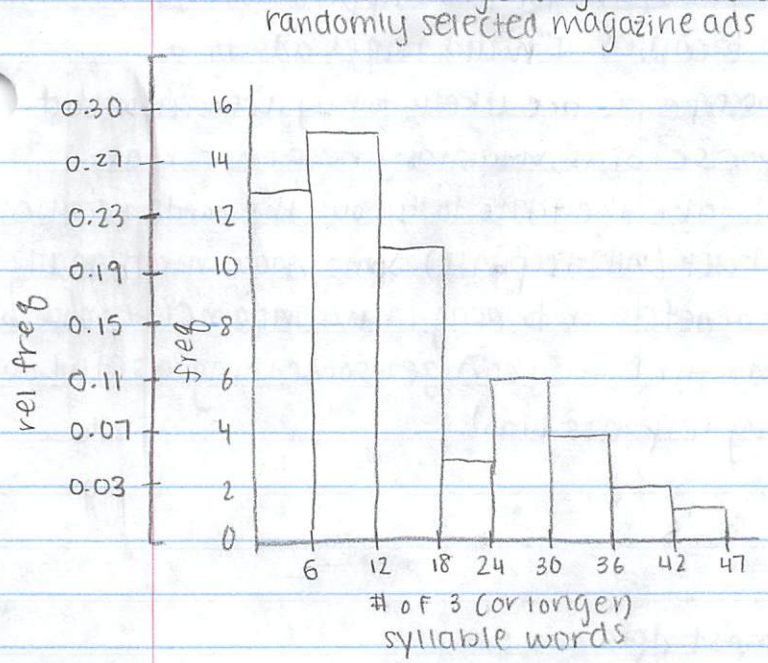
8a) use RNT or calculator to assign half to receive literature and be asked for donations and the other half to be contacted by phone and be asked for donations. There is no placebo because both groups know exactly what treatment it is receiving.
b) Randomly assign using RNT or calculator for 43 to be given actual tooth-whitening chemicals. The dentists/facilitators and the subjects should not know which toothpaste they are getting. Then, compare the results of the whiteness of the teeth.

6a) $\frac{43-0}{8} = 6$ (width)

b)

class limits	midpoints	freq	relfreq
0 - 5	2.5	13	0.24
6 - 11	8.5	15	0.27
12 - 17	14.5	11	0.20
18 - 23	20.5	3	0.05
24 - 29	26.5	6	0.11
30 - 35	32.5	4	0.07
36 - 41	38.5	2	0.04
42 - 47	44.5	1	0.02

c+d)



Analysis

- center: 0-18
- shape: skewed right
- spread: mean - 14.4
  med - 11

Magazines are targeted mostly to the common folk, so they don't want to use fancy or large vocabulary. Most use relatively few 3 or longer syllable words so the audience can understand the content.

9a) a. skewed left
b. uniform
c. symmetrical
d. bimodal
e. skewed right

b) skewed left - too many get high grades, uniform - everyone gets equal distribution so a 1% difference could determine an A or a B. symmetrical is good because the most people will receive the average score. Test 4 is either you

get the material or you don't. Test S (skewed right) causes too large of a number of students to fail. I would want test A so that the number of A's is large and relatively easy to do well on the test. I do not like Test S, because then a disproportionate number of students fail. because the test is too hard.

100) a - uniform
b - skewed right
c - skewed left
d - bimodal
e - symmetrical

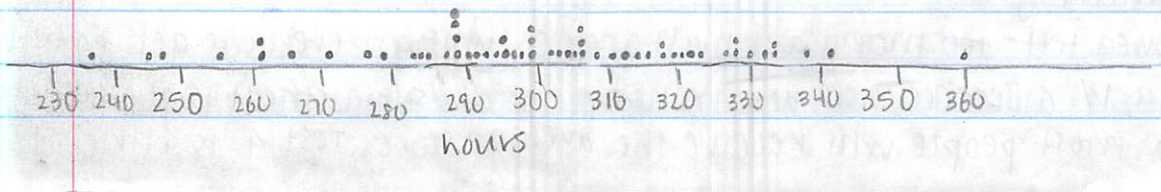
b) I would target microwaves to everyone, electric fans for lower income families, computers for upper class, TVs for low + upper classes, and snowblowers to medium income families. I would target ads to a specific income-distribution so more people are likely to buy a certain product.

c) Not valid, there is non-response bias, voluntary response bias, and response bias. Some do not take the time to fill out the cards because they cannot waste $ to send it back (non-response). Some may intentionally lie, thinking they will get more benefits or to brag about income (response bias). The responders are the ones who think they can get something useful out of filling out the cards (voluntary response bias).

13) a) 1
b) 5/51 ≈ 10%.
c) 650-750; there are the most dots.

14) can see overall spread, center, outliers, and specific data points on the dot plot, but a histogram doesn't reveal individual points or outliers well

Finish time (hrs) for Iditarod Dog Sled Race



cathy sun

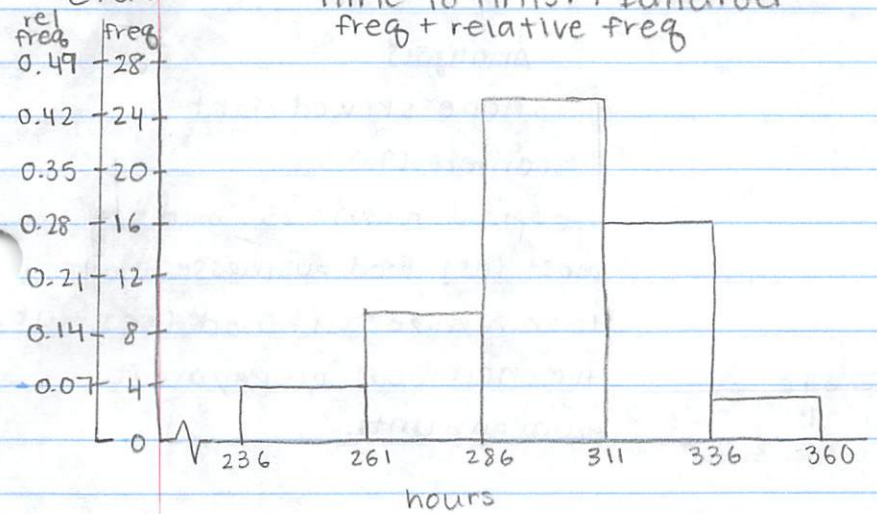
2.2 # 1, 2, 4-6, 9, 16, 13, 14

1a) $\frac{360-236}{5} = 25$

b)

class limits	Midpoint	Freq	Relative Freq
236-260	248	4	0.07
261-285	273	9	0.16
286-310	298	25	0.44
311-335	323	16	0.28
336-360	348	3	0.05

c+d)



Analysis

- center: 286-311
- shape: symmetrical
- spread: mean- 300
  median- 299

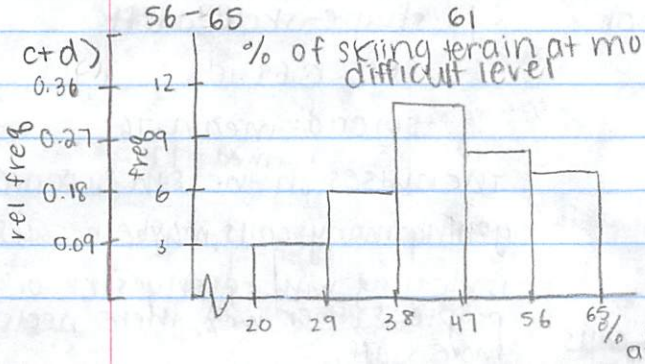
The dogs run about the same speed and can endure about the same time and weather. Thus, a majority of the times will be very close.

2a) $\frac{65-20}{5} = 9$

b)

class limits	Midpoint	Freq	Relative Freq
20-28	24	3	0.09
29-37	33	6	0.17
38-46	42	11	0.31
47-55	51	8	0.23
56-65	61	7	0.20

c+d)



Analysis

- spread: mean- 45, med- 45
- center: 38-47
- shape: skewed left

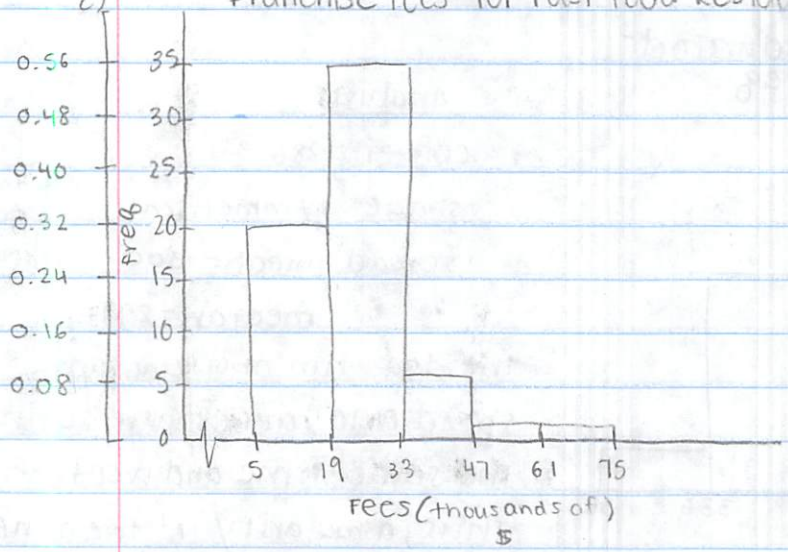
Ski areas want about equal distribution among easy, med, and hard to most have about 38-50% designated as more difficult

4a) $\frac{75-5}{5} = 14$ (width)

b)

Class Limits	Midpoint	Freq	Rel Freq
5 - 18	11.5	20	0.32
19 - 32	25.5	35	0.56
33 - 46	39.5	6	0.10
47 - 60	53.5	1	0.016
61 - 75	67.5	1	0.016

c) Franchise fees for Fast-food Restaurants



Analysis
- shape: skewed right
- center: 19-33
- spread: mean - 23 med - 24

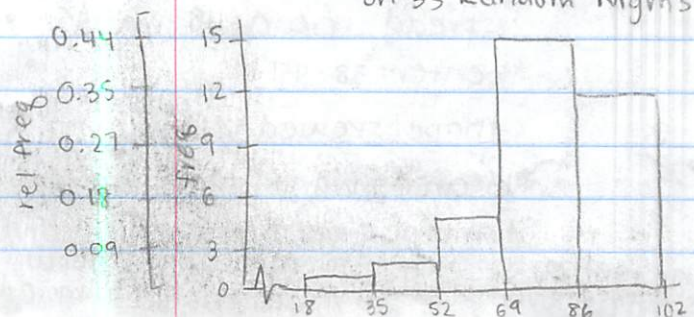
most fast-food businesses want to minimize fast-food fees, but the chains will all pay about equal amounts.

5a) $\frac{102-18}{5} = 17$ (width)

b)

Class Limits	Midpoint	Freq	Rel Freq
18 - 34	26	1	0.03
35 - 51	43	2	0.06
52 - 68	60	5	0.14
69 - 85	77	15	0.43
86 - 102	94	12	0.34

c+d) Room calls to Nurses on 8th Floor on 35 Random Nights



Analysis
- shape: skewed left
- center: 69-102
- spread: mean - 76 med - 77

The nurses on the 8th floor are getting many calls, maybe because it is dealing with severely sick or old people. Either way, there needs to be more staff.