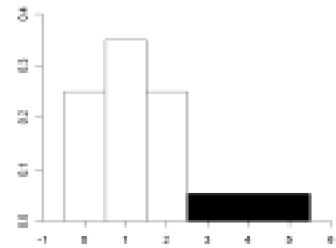
Statistics 515 - Spring 2003 -Exam 1 (*modified for Fall 2003 practice*) Answers

Part I:

1) The set of all 2003 Ford explorers is the **population**. The ten selected 2003 Ford explorers is the **sample**. The amount of damage is a **quantitative** variable.

2) The area must be 0.15 and since it is 3 units wide it must be 0.05 high (3x0.05=0.15)



Class Interval	Frequency	Relative Frequency
[-0.5, 0.5)	25	0.25
[0.5, 1.5)	35	0.35
[1.5, 2.5)	25	0.25
[2.5, 5.5)	15	0.15

3) These alumni salaries are **skewed right**. The school would look better if it reported the **mean** income of its alumni.

4) **Not normal so need to use Chebychev's theorem. 100+/-30 is 2 standard deviations so k=2. So at least $1-1/2^2 = 1-1/4 = 0.75 =$ 75%.**

5) P(A)=0.12, P(B)=0.16. What can we say about P(A|B) if A and B are independent? **P(A|B)=P(A)=0.12**
What can we say about P(A|B) if A and B are mutually exclusive? **P(A|B)=0**

6) P(A)=0.12, P(B)=0.16, and P(A∩B)=0.08. Find P(A|B). **P(A|B)= P(A∩B)/P(B) = 0.08/0.16 = 0.50**

7)

x	1	4	7
p(x)	0.25	0.5	0.25

$\mu = \Sigma xp(x) = 1(0.25)+4(0.5)+7(0.25)=0.25+2+1.75=4$
$\sigma^2= \Sigma(x-\mu)^2p(x) = (1-4)^2 0.25+(4-4)^2 0.5+(7-4)^2 0.25 = 2.25+0+2.25=4.5$
σ=sqrt(4.5)= 2.12132

8) How many different ways are there to divide a group of fifteen people into one group of size 4 and another of size 11?
(15 Choose 4) = 15!/(4! 11!) = $\frac{15*14*13*12*11*10*9*8*7*6*5*4*3*2*1}{4*3*2*1*11*10*9*8*7*6*5*4*3*2*1} = \frac{15*14*13*12}{4*3*2*1}$ = 5*7*13*3= 1365

Part II:

1a) Find the mean. **(5 oz.+ 4 oz. + 2 oz.+ 2 oz. + 7 oz.)/5 = 20 oz./5 = 4 oz.**

b) Find the median. 2 oz. 2oz. **4oz.** 5 oz. 7oz.

c) Find the range. **7oz. - 2oz. = 5oz.**

d) Find the variance. **$((5-4)^2 + (4-4)^2 + (2-4)^2 + (2-4)^2 + (7-4)^2)/(5-1) = (1\ oz^2+0\ oz^2+4\ oz^2+4\ oz^2+9\ oz^2)/4 = 18/4 = 4.5\ oz^2$**

e) Find the standard deviation **sqrt(4.5 oz^2)=2.12132 oz**

2) A candidate in a primary election hopes to have support from at least 35% of the likely voters in a state. A random survey of 200 likely voters is made the day before the election.

a) Why is it ok that p-changes. **The population of an entire state is so large, that taking out only a few hundred people won't change the percentage very much, so it is ok to assume it didn't change. (see example 4.7 on pages 189-190)**

b) If 35% of the likely voters in the entire state favor the candidate, what is the probability that exactly 80 of the 200 surveyed will favor the candidate? **$200!/(80!\ 120!)\ (0.35)^{80}\ (0.65)^{100-80}$ (Comes out to 0.0196 = 1.96% if you were to actually solve it.)**

c) If 35% of the likely voters in the entire state favor the candidate, how many of the 200 surveyed are expected to favor her?
μ=np=200(0.35)=70

d) If 35% of the likely voters in the entire state favor the candidate, what is the standard deviation of the number out of 200 surveyed who will favor her? **σ=sqrt(np(1-p))=sqrt(200(0.35)(0.65))=sqrt(45.5)= 6.745369**