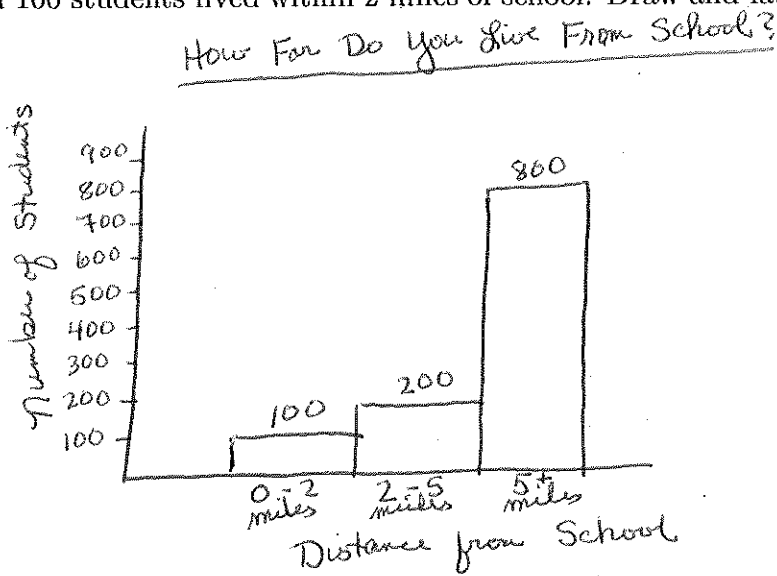Math 310 - Dr. Miller - Exam #3, Version #1 - Spring 2008

1. *[8 pts]* A survey at United Local School District determined the following: 800 students lived more than 5 miles from school, 200 students lived between 2 and 5 miles from school, and 100 students lived within 2 miles of school. Draw and label a histogram for this data.

(-1) title
(-1) bar graph
(-1) label bad bar.

How Far Do You Live From School?

Number of Students

900
800
700
600
500
400
300
200
100

800

200

100

0-2 miles   2-5 miles   5+ miles

Distance from School

2. (a) *[8 pts]* Draw and label a box-and-whisker plot for the data below, where 6 | 4 = 64:

Scores on Exam #5

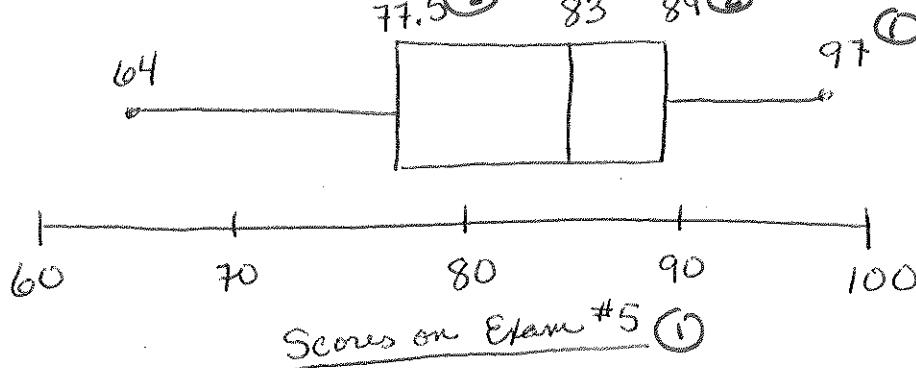13 scores

9 | 7, 5, 1
8 | 3, 6, 7, 1, 6
7 | 2, 9, 8, 7
6 | 4

64, 72, 77, 78, 79, 81, (83), 86, 86, 87, 91, 95, 97

77.5 LQ   med   89 UQ

77.5 ②   83 ②   89 ②   97 ①

64

Scores on Exam #5 ①

60   70   80   90   100

(b) *[2 pts]* Find the mean, median, and mode of the above data, telling which is which.

mean = 1076 ÷ 13 = 82.8

median = 83

mode = 86

3. *[4 pts - 2 each]* Name the type of statistical graph that would *best* represent each type of data.

   (a) the frequency of grades, including W's and incompletes, in a college history course

   bar graph

   (b) the portion of your school district's tax revenues that goes toward teacher salaries, educational materials, busing, extra-curricular activities, etc.

   circle graph/pie chart

4. *[4 pts]* Kevin averaged 8.3 on his first 9 quizzes in German class, and 7.1 on the next 6. What was his overall average, rounded to the nearest tenth? Show clear work.

   $$\frac{(8.3)(9) + (7.1)(6)}{15} = \frac{117.3}{15} = 7.82$$

5. *[6 pts]* Sandra got a 58, 67, 75, 72, and 64 on her first five (of six) lab reports in chemistry. What must she earn on the last one in order to get a C (69%) in the course? Explain your reasoning.

   -2

   On 3 reports, she fell below the cut-off by a total of $11 + 2 + 5$ = 18 deficit points. On 2 reports, she exceeded the cut-off by a total of $6 + 3 = 9$ surplus points. Overall, she's still 9 points too low, so she must make those up on top of getting a C on the last report. She needs $69 + 9 = 78$ pts.

6. *[10 pts - 3-4 each]* For each item below, make up a set of 5 numbers between 0 and 100, inclusive, with the given properties. If not possible, verbally explain why.

   (a) mean equals 50, median equals 60

   ___ ___ 60 ___ ___   total = 250

   (b) mean equals 10, median equals 60

   not possible – a mean of 10 makes a total of 50, which can't include a score of 60 anywhere.

   (c) the median changes by more than 10 points when a sixth score of 0 is included

   (0) ___ ___ ⌐‾⌐ ___ ___
          20-pt spread.

7. *[8 pts]* The weights of chicken eggs are normally distributed with a mean of 1.5 ounces and a standard deviation of 0.5 ounce.

(a) What percentage of all eggs weigh between 1 and 2 ounces? ⎡68%⎤ ②

2.4% 13.5% 34% 34% 13.5% 2.4% $.1\%$

③

0   0.5   1.0   1.5   2.0   2.5   3.0
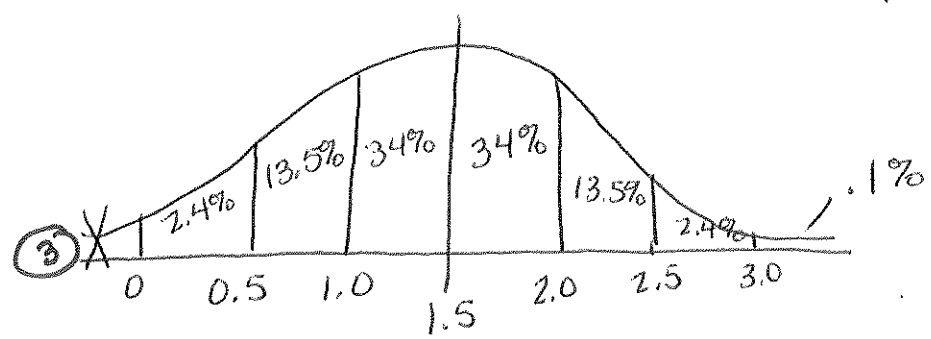
(b) An egg must be in the top 2.5% to be classified as "extra large." Above what weight are eggs considered to be extra large? ③ ⎡2.5 ounces⎤

⊘② 3
⊘③ all others

8. *[6 pts]* Draw a spinner labelled with the numbers 5, 6, 7, 8, 9 so that all of the following conditions will be true.

② • The probability of landing on an even number is 1/2.
② • The probability of landing on a perfect square is 0.
② • The probability of landing on 5 is half the probability of landing on 7.

5   6
7   8
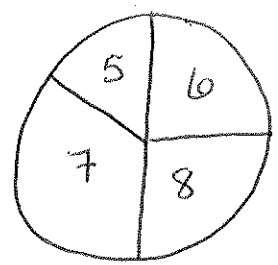
9. *[12 pts - 4 each]* Consider the experiment of drawing one card from a complete deck.

(a) Find the probability that the card is not black and not a face card (jack, queen, king).

⊘③ $\dfrac{32}{52}$

$26 \;-\; 6 = 20$

$\dfrac{20}{52}$

(b) Find the probability that the card is red or has a 2, 4, or 6 on it.

⊘③ $\dfrac{38}{52}$ $\dfrac{32}{52}$ $26 \;+\; 6 = 32$

(c) Find the probability that the card is a king, given that it is higher than an 8.

9, 10, J, Q, K : $\dfrac{4}{20}$ or   9, 10, J, Q, K, A : $\dfrac{4}{24}$

10. *[16 pts - 4 each]* Consider the experiment of rolling a die and spinning a wheel marked 1, 2, 3.

    (a) List the members of a uniform sample space for this experiment.

    $(1,1)$ $\quad$ $(2,1)$ $\quad$ $(3,1)$ $\quad$ $(4,1)$ $\quad$ $(5,1)$ $\quad$ $(6,1)$

    $(1,2)$ $\quad$ $(2,2)$ $\quad$ $(3,2)$ $\quad$ $(4,2)$ $\quad$ $(5,2)$ $\quad$ $(6,2)$

    $(1,3)$ $\quad$ $(2,3)$ $\quad$ $(3,3)$ $\quad$ $(4,3)$ $\quad$ $(5,3)$ $\quad$ $(6,3)$

    (d,w)

    (b) What is the probability that the number on the wheel is at least as large as that on the die?

    $\frac{6}{18}$

    (c) What are the odds against getting a sum that's a multiple of 3?

    $12:6$

    (d) Interpret these odds verbally, using the phrase "for every."

    For every 12 times you don't get such a sum, there are 6 times you do.

11. *[4 pts]* The probability that G does not happen is 3/8. What are the odds in favor of G?

    $5:3$

12. *[12 pts - 4 each]* A security code consists of three digits followed by four letters.

    (a) How many different codes are possible if repeated digits and letters are allowed?

    — — — — — — — $\qquad$ $10^3 \cdot 26^4$

    (b) How many different codes use only the letters A, B, or C? (Repeats still allowed.)

    $10^3 \cdot 3^4$

    (c) How many different codes do not repeat any digits or letters and also do not use any 3's, 6's, or 9's?

    $7 \cdot 6 \cdot 5 \cdot 26 \cdot 25 \cdot 24 \cdot 23$