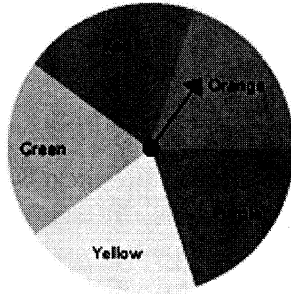# Math 206 - Test 2

March 7, 2018

Name __key__

Score _____

Show all work to receive full credit. Supply explanations where necessary.

1. (3 points) A spinner is constructed by dividing a circle into 5 colored regions of equal size (see below). Explain how you would use a random digit table to simulate spinning the spinner 10 times.

LET

0,1 REPRESENT RED;

2,3 REPRESENT ORANGE;

4,5 REPRESENT PURPLE;

6,7 REPRESENT YELLOW; AND

8,9 REPRESENT GREEN.

CHOOSE A RANDOM STARTING LOCATION ON THE RANDOM DIGIT TABLE. SELECT 10 DIGITS STARTING AT THAT LOCATION. THE 10 DIGITS SIMULATE 10 SPINS. FOR EXAMPLE, 93129 40386 SIMULATES 4,O,R,O,G,P,R,O,G,Y.

2. (3 points) A pair of dice are rolled. All possible outcomes are shown below.

← Sum of 7

PROB IS $\frac{6}{36}$

(a) What are the odds in favor of rolling a sum of 7?

6 : 30   or   1 : 5

(b) What are the odds against rolling a sum of 7?

5 : 1

1

3. (2 points) Let A be the event that a randomly selected household has a pet cat. Suppose the odds against A are $8:3$. What is the probability of A?

↘ Odds in favor are

$$3:8 \longrightarrow \text{Prob is } \boxed{\frac{3}{11}}$$

4. (3 points) Suppose five quarters, four dimes, five nickels, and eleven pennies are in a jar. One coin is selected at random. What is the expected amount of money drawn from the jar?

5/25 25¢
4/25 10¢
5/25 5¢
11/25 1¢
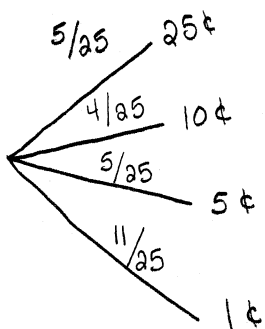
Expected value =

$$25\left(\frac{5}{25}\right) + 10\left(\frac{4}{25}\right) + 5\left(\frac{5}{25}\right) + 1\left(\frac{11}{25}\right)$$

$$= \frac{125 + 40 + 25 + 11}{25} = \frac{201}{25} = \boxed{8.04 \text{ ¢}}$$

5. (3 points) A game consists of rolling a regular die with prizes awarded as follows:

- Roll a 6 and win $10
- Roll a 1 or 2 and win $3
- Roll a 3, 4, or 5 and win $1

If the game is to be fair, how much should it cost to play?

$$\text{Expected value} = 10\left(\frac{1}{6}\right) + 3\left(\frac{2}{6}\right) + 1\left(\frac{3}{6}\right)$$

$$= \frac{10 + 6 + 3}{6} = \frac{19}{6} = 3.1\overline{6}$$

To be fair, cost = expected value

⟹ It should cost $\boxed{\$3.^{17}}$

6. (2 points) Professor Granger has taught a calculus course every semester for many years. The following list gives the numbers of students enrolled each semester, in the order in which they occurred. Sketch the corresponding dot plot.

29 27 27 21 34 24 24
32 27 25 27 25 28 26
29 28 32 23 20 29 21
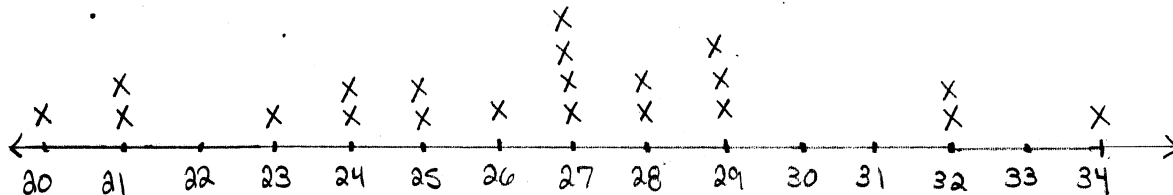
7. (3 points) Consider the bar graph shown below.

Favorite Type of Movie
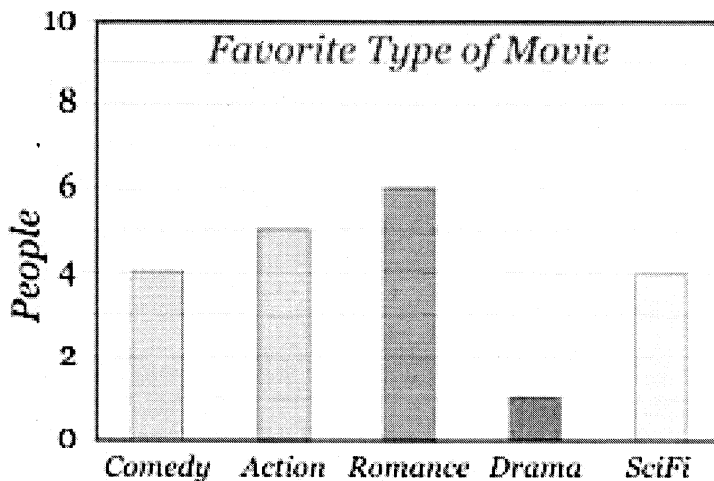
(a) How many people are in the sample described by the graph?

$$4 + 5 + 6 + 1 + 4 = \boxed{20}$$

(b) For what percent of people were their favorite movies Drama or SciFi?

$$\frac{5}{20} = \boxed{25\%}$$

(c) Describe two things about this graph that make it very clear that it is NOT a histogram.

THE DATA ARE CATEGORICAL (TYPE OF MOVIE).

THE BARS ARE SPACED.

3

8. (6 points) For each of the following situations, tell which type of graph would best display the data. Choose from *dot plot, bar graph, line graph, scatterplot, pie chart, histogram,* or *stem-and-leaf plot.* You may get partial credit if you offer brief explanations.

(a) After collecting data from over 1000 people, Stephanie is constructing a graph that shows the seven most common causes for quitting a job.

BAR GRAPH

(b) The author of a geography textbook wants to show a graph displaying the portions of the earth's land surface taken up by the seven continents.

PIE CHART

(c) Health researchers weighed 500 fourth-grade children and summarized their data in a grouped frequency table . They want to make a graph illustrating their frequency distribution.

HISTOGRAM

(d) A stock chart shows the value of a particular stock throughout the day. What type of graph is a stock chart?

LINE GRAPH

(e) Jon rolled a six-sided die 25 times. He would like to make a graph showing the numbers that he rolled.

DOT PLOT

(f) At the end of the semester, a professor made a list containing his students' ages and their corresponding final exam scores. He formed ordered pairs and plotted the data.

SCATTER PLOT

4

9. (2 points) Organize the following data into a stem-and-leaf plot.

2.1 3.2 4.8 1.2 2.8 3.2 3.6 3.7 3.8 4.9
4.7 3.2 4.8 5.1 1.0 2.7 5.0 2.1 2.4 1.2

1	0 2 2
2	1 1 4 7 8
3	2 2 2 6 7 8
4	7 8 8 9
5	0 1
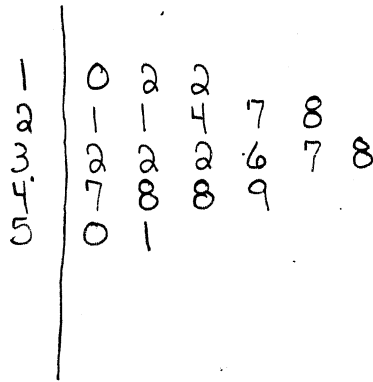
3 | 2 MEANS

3.2

10. (2 points) In a recent study, a large number of heterosexual couples in committed relationships were asked whether the man or woman said "I love you" first. In this context, would the collected data be qualitative (categorical) or quantitative (numerical)? Explain why you think so.

QUALITATIVE / CATEGORICAL

THE COLLECTED DATA WOULD CONSIST
OF THE WORDS "MAN" OR "WOMAN"
THESE ARE CATEGORIES / LABELS.

11. (2 points) Suppose you constructed a pie chart (circle graph) from a given collection of data. How would the graph change if you doubled the amount associated with each category? Explain.
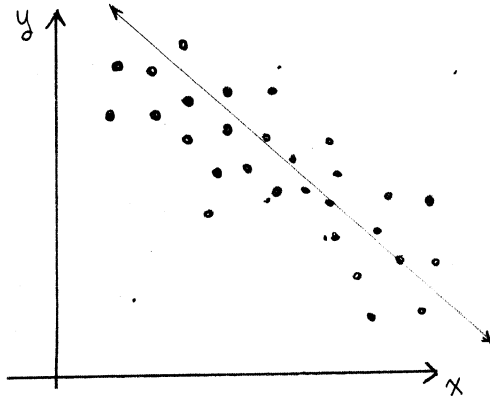
THE GRAPH WOULD NOT CHANGE AT ALL.

PERCENTAGES TO NOT CHANGE IF
ALL DATA ARE DOUBLED
(OR SCALED BY ANY NONZERO
CONSTANT VALUE).

12. (2 points) Sketch a scatterplot showing a collection of data with a weak negative linear association. Also roughly sketch the trend line.

13. (3 points) In the following stem-and-leaf plot, 4|2 means 42. Compute the mean, median, and mode(s).

$$
\begin{array}{c|cccccc}
3 & 6 & 8 \\
4 & 0 & 2 & 7 \\
5 & 5 & 5 & 6 & 7 & 8 & 8 \\
6 & 7 & 7 & 7 \\
7 & 5 \\
\end{array}
$$

MEAN: $\overline{X} = \dfrac{36 + 38 + 40 + \cdots + 75}{15} = \dfrac{818}{15} = \boxed{54.5\overline{3}}$

MEDIAN: MED = 8TH VALUE = $\boxed{56}$

MODE: MODE = $\boxed{67}$

14. (2 points) The mean price of a family-size bag of Doritos at four local stores is \$4.21. The mean price at two other stores is \$4.74. What is the mean price of the Doritos at all six of the stores?
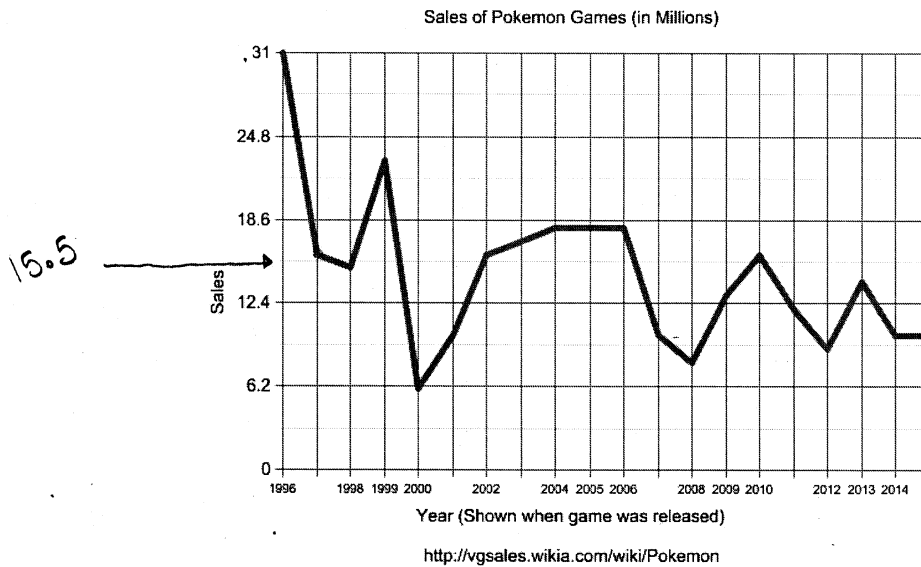
$$\overline{X} = \dfrac{4(4.21) + 2(4.74)}{6} = 4.38\overline{6} \approx \boxed{\$4.39}$$

6

15. (2 points) The following table gives the annual salaries of the 50 employees at a certain company. Without computing them, which would be the more appropriate measure of center, the mean or the median? Explain.

Salary ($)	No. of employees
18,000	2
22,000	6
32,000	24
48,000	15
80,000	2
150,000	1

THE MEDIAN WOULD BE MORE APPROPRIATE BECAUSE IT WOULD NOT BE GREATLY AFFECTED BY THE EXTREME VALUES ON THE HIGH END.

16. (3 points) Consider the graph shown below.

Sales of Pokemon Games (in Millions)

15.5 →

Year (Shown when game was released)

http://vgsales.wikia.com/wiki/Pokemon

(a) What is the name of this type of graph?   LINE GRAPH (TIME-SERIES GRAPH)

(b) By how much did sales change from 1996 to 1997?

≈ 31 - 16 = 15 MILLION DECREASE IN SALES

(c) In what year were the least sales?

GRAPH IS AT LOWEST POINT IN 2000

7

Deliberately blank.