Review Questions for the First Exam

Fall 20017
Nikos Apostolakis

1. A random sample of 30 heights (in hundredths of inches, $100 = 1$ inch) from a population is given below:

$$
\begin{array}{ccccc}
6578 & 7151 & 6939 & 6821 & 6778 \\
6869 & 6980 & 7001 & 6790 & 6678 \\
6648 & 6762 & 6830 & 6711 & 6827 \\
7109 & 6646 & 6864 & 7123 & 6713 \\
6783 & 6887 & 6348 & 6842 & 6762 \\
6720 & 7084 & 6749 & 6653 & 6544 \\
\end{array}
$$

   (a) Construct a frequency table for the above data, listing the class limits, the class boundaries, the class midpoint, the frequency and the relative frequency. Use six classes.

   (b) Draw a histogram for the frequency table in Part (a).

2. Consider the following data set:

$$12 \quad 13 \quad 18 \quad 18 \quad 21$$

   Find the mean, median, mode and standard deviation.

3. A random sample of 30 heights (in inches) from a population is given below:

$$
\begin{array}{ccccc}
65.78 & 71.51 & 69.39 & 68.21 & 67.78 \\
68.69 & 69.80 & 70.01 & 67.90 & 66.78 \\
66.48 & 67.62 & 68.30 & 67.11 & 68.27 \\
71.09 & 66.46 & 68.64 & 71.23 & 67.13 \\
67.83 & 68.87 & 63.48 & 68.42 & 67.62 \\
67.20 & 70.84 & 67.49 & 66.53 & 65.44 \\
\end{array}
$$

   Given that the mean is $\bar{x} = 68.07$ and the standard deviation is $s = 1.81$:

   (a) Find a 75% Chebyshev interval about the mean for the data set above.

   (b) How many data values does Chebyshev's theorem predict will be within two standard deviations of the mean?

   (c) How many of the data values are within two standard deviations of the mean? How does this compare to your result in Part (b)?

4. The following data represent the duration (in days) of U.S. space shuttle voyages for the years 1992-94.

$$8 \ 9 \ 9 \ 14 \ 8 \ 8 \ 10 \ 7 \ 6 \ 9 \ 7 \ 8 \ 10 \ 14 \ 11 \ 8 \ 14 \ 11$$

   (a) Find the mode, the median, and the first and the third quartile.

   (b) What percentile is the value 7?

5. Calculate the range, mean, median, first and third quartiles, interquartile range, mode, variance, and standard deviation for the following data.

$$47 \quad 59 \quad 50 \quad 56 \quad 56 \quad 51 \quad 53 \quad 57 \quad 52 \quad 49$$

6. Match the appropriate statement about r and the scatter diagrams.

A. $r = 0$.   B. $r = -1$.   C. r is more than 0 and less than 1.
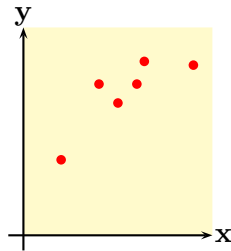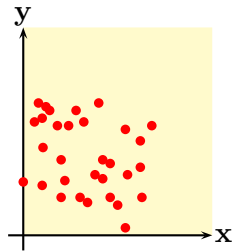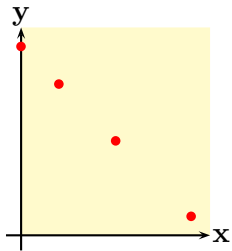
7. Consider the following set of paired data, representing heights in inches (x) and weights in pounds (y):

x	62	65	74	58
y	135	130	190	100

(a) Draw a scatter diagram for the data in the following grid. Make sure to chose appropriate scales for the axes, and to mark appropriate points in each axis.
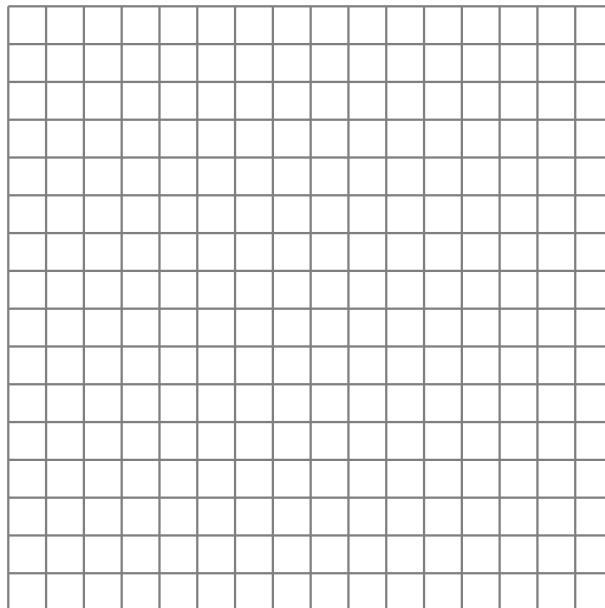
(b) Based on the diagram, what would you estimate the coefficient of correlation r to be?

(c) Compute r.

(d) Find the the equation of the least squares line.

(e) Use the equation in part (c)) to estimate the weight of a person with a height of 70 inches. Explain why this estimation is appropriate.

(f) Explain why it's not appropriate to use the equation in part (c) to estimate the weight of a person with a height of 80 inches.

8. A survey of MTH 23 students was conducted regarding whether a student spent at least 3 hours per week on homework and whether the student passed the class. The results of the survey are summarized in the table below:

	At least 3 hours	Less than 3 hours	TOTAL
Passed class	68	22	90
Failed class	12	50	62
TOTAL	80	72	152

Compute the following probabilities:

(a) Find the probability that a student selected at random will pass MTH 23.

(b) Find the probability that a student selected at random will pass MTH 23, given that they study for at least three hours per week.

(c) Find the probability that a student selected at random will pass MTH 23 **and** that they will study less than three hours per week.

(d) Find the probability that a student selected at random will pass MTH 23 **or** that they will study for more than three hours per week.

9. Consider the experiment of rolling two dice. The following table lists all possible outcomes.

$$
\begin{array}{cccccc}
1\,6 & 2\,6 & 3\,6 & 4\,6 & 5\,6 & 6\,6 \\
1\,5 & 2\,5 & 3\,5 & 4\,5 & 5\,5 & 6\,5 \\
1\,4 & 2\,4 & 3\,4 & 4\,4 & 5\,4 & 6\,4 \\
1\,3 & 2\,3 & 3\,3 & 4\,3 & 5\,3 & 6\,3 \\
1\,2 & 2\,2 & 3\,2 & 4\,2 & 5\,2 & 6\,2 \\
1\,1 & 2\,1 & 3\,1 & 4\,1 & 5\,1 & 6\,1 \\
\end{array}
$$

(a) What's the probability that the outcome of at least one die is more than 4?

(b) Let x stand for the sum of the two outcomes. Complete the following table of probabilities:

x	$P(x)$
1	
2	
3	
4	
5	
6	

(c) Use the table you constructed in part (b) to compute the probabilities of the following events:

   i. The sum of the outcomes of the two dice is 8 or more.

   ii. The sum of the outcomes of the two dice is less than 6.

    iii. The sum of the outcomes of the two dice more than 5 but less than 8.

    iv. The sum of the outcomes of the two dice is even.

    v. The sum of the outcomes of the two dice is odd.

10. An inspection of a random sample of 485 iPods shows that 18 have defective screens. What is the probability that an iPod selected at random does **not** have a defective screen?