

Name: * Answer Key *

Math 17300-CD Introduction to Probability and Statistics

2/20/2019

Quiz 1

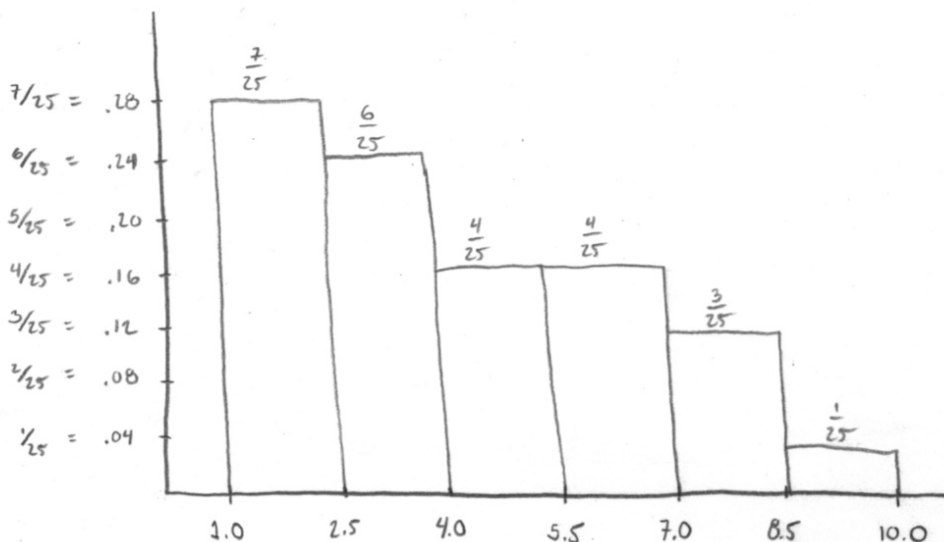
1. Here are 25 measurements (listed from least to greatest).

1.0, 1.3, 1.9, 1.9, 1.9, 2.3, 2.4, 2.6, 2.6, 2.8, 3.2, 3.7, 3.9,

4.0, 4.4, 5.1, 5.3, 5.9, 6.0, 6.0, 6.8, 7.1, 7.5, 8.3, 9.1

(a) (8 points) Create a relative frequency histogram below using 6 classes of width 1.5. The first class should be [1.0, 2.5).

CLASS	FREQUENCY
[1.0, 2.5)	7
[2.5, 4.0)	6
[4.0, 5.5)	4
[5.5, 7.0)	4
[7.0, 8.5)	3
[8.5, 10.0)	1



(b) (4 points) What proportion of the measurements are less than 4.0?

$$\frac{13}{25} = .52$$

(c) (4 points) How would you best describe the distribution: right-skewed, left-skewed, or symmetric?

right-skewed

(d) (4 points) Let \bar{x} and m denote the mean and median of the above measurements, respectively. Circle only the statement that is true. (Hint: your answer to part (c) should tell you the answer.)

i. $\bar{x} < m$

ii. $m < \bar{x}$

2. You are given a sample of $n = 6$ measurements: 9, 7, 10, 13, 8, 13

(a) (4 points) What is the median, m ?

in order: 7 8 9 10 13 13 $m = \frac{9+10}{2} = \boxed{9.5}$

(b) (4 points) What is the mean, \bar{x} ?

$$\bar{x} = \frac{\sum x_i}{n} = \frac{7 + 8 + 9 + 10 + 13 + 13}{6} = \frac{60}{6} = \boxed{10}$$

(c) (4 points) What is/are the mode/modes, M ?

$$M = \boxed{13}$$

(d) (4 points) What is the sample variance, s^2 ?

x_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
7	-3	9
8	-2	4
9	-1	1
10	0	0
13	3	9
13	3	9
		32

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1} = \frac{9 + 4 + 1 + 0 + 9 + 9}{6-1} = \frac{32}{5} = \boxed{6.4}$$

(e) (4 points) What is the sample standard deviation, s ?

$$s = \sqrt{s^2} = \sqrt{6.4} \approx \boxed{2.5298}$$

3. (4 points) Suppose a sample of 500 measurements are collected with mean $\bar{x} = 72$ and standard deviation $s = 6$. According to Tchebysheff's theorem, at least how many measurements lie between 60 and 84 (i.e. within 2 standard deviations of the mean)?

$$\uparrow$$

$$k=2$$

$$\left[1 - \left(\frac{1}{k} \right)^2 \right] = 1 - \left(\frac{1}{2} \right)^2 = 1 - \frac{1}{4} = \frac{3}{4}$$

\therefore AT LEAST $\frac{3}{4}$ OF MEASUREMENTS

$$\frac{3}{4} (500) = \boxed{375}$$

4. (4 points) Circle the expressions below that equal the number of ways of selecting and arranging r objects out of n objects (order matters). Underline the expressions below that equal the number of ways of choosing r objects out of n objects (order does not matter).

(a) P_r^n

(c) $\frac{n!}{r!(n-r)!}$

(b) C_r^n

(d) $\frac{n!}{(n-r)!}$

5. (4 points) In how many ways can you select five people from a group of eight if the order of selection is important?

$$P_5^8 = \frac{8!}{3!} = 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 = \boxed{6720}$$

6. (4 points) In how many ways can you select two people from a group of 20 if the order of selection is not important?

$$C_2^{20} = \frac{20!}{2!18!} = \frac{20 \cdot 19}{2} = \boxed{190}$$

7. (4 points) You own 4 pairs of jeans, 12 clean T-shirts, and 4 wearable pairs of sneakers. How many outfits (jeans, T-shirt, and sneakers) can you create?

$$(4)(12)(4) = \boxed{192}$$

8. (4 points) A businessman in New York is preparing an itinerary for a visit to six major cities. The distance traveled, and hence the cost of the trip, will depend on the order in which he plans his route. How many different itineraries (and trip costs) are possible?

$$P_6^6 = 6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 = \boxed{720}$$