Name: * ANSWER KEY * 6/12/2017

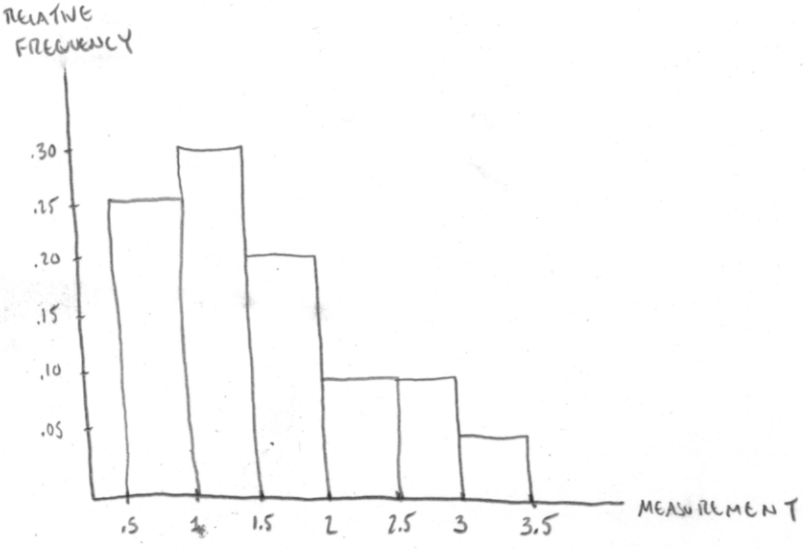
Math 173 Introduction to Probability and Statistics Quiz 1

1. Here are 20 measurements (listed from least to greatest).

.50, .56, .78, .91, .91, 1.01, 1.03, 1.11, 1.21, 1.33,
1.46, 1.50, 1.65, 1.66, 1.84, 2.27, 2.49, 2.50, 2.88, 3.11

(a) (8 points) Create a relative frequency histogram below using 6 classes of width .5. The first class should be $[.5, 1)$.

CLASS	FREQ.	REL. FREQ.
[.5, 1)	5	5/20 = .25
[1, 1.5)	6	6/20 = .30
[1.5, 2)	4	4/20 = .20
[2, 2.5)	2	2/20 = .10
[2.5, 3)	2	2/20 = .10
[3, 3.5)	1	1/20 = .05



I MEANT TO NOT INCLUDE THIS
SO THAT THE ANSWER IS THE SUM OF
THE REL. FREQ. OF CLASS 1 & CLASS 2:

.25 + .30 = .55

(b) (4 points) What proportion of the measurements are less than or equal to 1.5?

AS WRITTEN, THE ANSWER IS 12 OUT OF 20

= 12/20 = .60

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

RIGHT-SKEWED (RIGH TAIL)

2. You are given a sample of $n = 6$ measurements: 2, 3, 4, 5, 3, 7.

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

MIDDLE VALUE OR AVERAGE OF MIDDLE VALUES WHEN WRITTEN IN ORDER : 2, 3, 3, 4, 5, 7

$$m = \frac{3+4}{2} = \frac{7}{2} = \boxed{3.5}$$

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

$$\bar{x} = \frac{1}{n}\sum x_i = \frac{1}{6}(2+3+4+5+3+7) = \frac{1}{6}(24) = \boxed{4}$$

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

MOST FREQUENTLY OCCURRING MEASUREMENT $M = \boxed{3}$

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

x_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
2	-2	4
3	-1	1
4	0	0
5	1	1
3	-1	1
7	3	9

$$s^2 = \frac{1}{n-1}\sum (x_i - \bar{x})^2$$

$$= \frac{1}{5}(4+1+0+1+1+9)$$

$$= \frac{1}{5}(16) = \boxed{3.2}$$

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

$$s = \sqrt{s^2} = \boxed{1.7889}$$

3. (4 points) Suppose a sample of 100 measurements are collected with mean $\bar{x} = 12.6$ and standard deviation $s = 1.2$. According to Tchebysheff's theorem, at least what proportion of measurements lie between 9.6 and 15.6 (i.e. within 2.5 standard deviations of the mean)?

← I MEANT TO SAY "HOW MANY"

$$1 - \left(\frac{1}{k}\right)^2 = 1 - \left(\frac{1}{2.5}\right)^2 = 1 - \frac{1}{6.25} = .84$$

.84 = 84% OF MEASUREMENTS

(SINCE 100 MEASUREMENTS, AT LEAST 84 LIE BETWEEN 9.6 & 15.6)