Name: *ANSWER KEY* 2/15/2017

Math 173 Introduction to Probability and Statistics **Quiz 1**

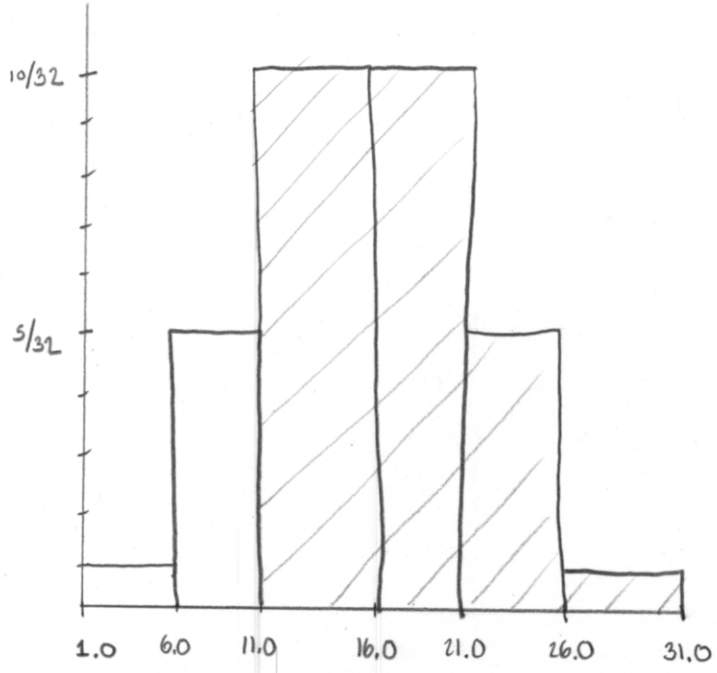
1. Here are 32 measurements (listed from least to greatest).

1.0, 6.2, 7.2, 7.5, 9.7, 10.5, 11.4, 11.8, 12.1, 12.1, 13.6, 14.3, 14.3, 14.6, 14.7, 15.2,
16.2, 16.2, 16.5, 17.6, 18.1, 19.8, 19.8, 20.3, 20.5, 20.5, 22.1, 23.2, 23.2, 24.1, 25.8, 30.9

(a) (8 points) Create a relative frequency histogram below using 6 classes of width 5.

CLASSES WILL BE INTERVALS OF LENGTH 5, BEGINNING AT THE LOWEST MEASUREMENT, 1.0, AND WILL INCLUDE THEIR LEFT ENDPOINT (NOT RIGHT).

CLASS	FREQUENCY	RELATIVE FREQUENCY
[1,6)	1	1/32
[6,11)	5	5/32
[11,16)	10	10/32
[16,21)	10	10/32
[21,26)	5	5/32
[26,31)	1	1/32



(b) (4 points) What proportion of the measurements are greater than or equal to 11?

$$\frac{10}{32} + \frac{10}{32} + \frac{5}{32} + \frac{1}{32} = \boxed{\frac{26}{32} \text{ or } \frac{13}{16}}$$

SHADED PART

(c) (2 points) How would you best describe the distribution, right-skewed, left-skewed, or symmetric?

SYMMETRIC

2. You are given $n = 5$ measurements: 6, 3, 5, 6, 5.

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

MIDDLE VALUE, IN ORDER: 3, 5, 5, 6, 6 ↓ $\boxed{m = 5}$

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

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = \frac{6+3+5+6+5}{5} = \frac{25}{5} \Rightarrow \boxed{\bar{x} = 5}$$

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

TWO MODES: $\boxed{5 \text{ AND } 6}$

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

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2 = \frac{1}{4}\left[(6-5)^2 + (3-5)^2 + (5-5)^2 + (6-5)^2 + (5-5)^2\right]$$

$$= \frac{1}{4}(1^2 + 2^2 + 0^2 + 1^2 + 0^2) = \frac{1}{4}(1+4+1) = \frac{6}{4} = \boxed{\frac{3}{2} \text{ or } 1.5}$$

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

$$s = \sqrt{s^2} = \boxed{\sqrt{\frac{3}{2}} \text{ or } \sqrt{1.5}}$$

HW EXERCISE 4.2 FROM §4.3 →

3. A Sample space S consists of five simple events with the following probabilities.

$$P(E_1) = P(E_2) = .15 \qquad P(E_3) = .4 \qquad P(E_4) = 2P(E_5)$$

(a) (4 points) Find the probabilities for simple events E_4 and E_5.

PROB. OF SIMPLE EVENTS MUST ADD UP TO 1: $P(E_1) + P(E_2) + P(E_3) + P(E_4) + P(E_5) = 1$

$\Rightarrow .15 + .15 + .4 + P(E_4) + P(E_5) = 1 \Rightarrow P(E_4) + P(E_5) = .3$

$\Rightarrow 2P(E_5) + P(E_5) = .3 \Rightarrow 3P(E_5) = .3 \Rightarrow \boxed{P(E_5) = .1 \text{ AND } P(E_4) = .2}$

(b) (4 points) Find the probabilities for the following two events.

$$A = \{E_1, E_3, E_4\} \qquad B = \{E_2, E_3\}$$

$P(A) = P(E_1) + P(E_3) + P(E_4)$

$= .15 + .4 + .2 = \boxed{.75}$

$P(B) = P(E_2) + P(E_3)$

$= .15 + .4 = \boxed{.55}$

(c) (4 points) List the simple events that are either in event A or event B or both.

$\boxed{\{E_1, E_2, E_3, E_4\}} \quad (= A \cup B)$

(d) (4 points) List the simple events that are in both event A and event B.

$\boxed{\{E_3\}} \quad (= A \cap B)$