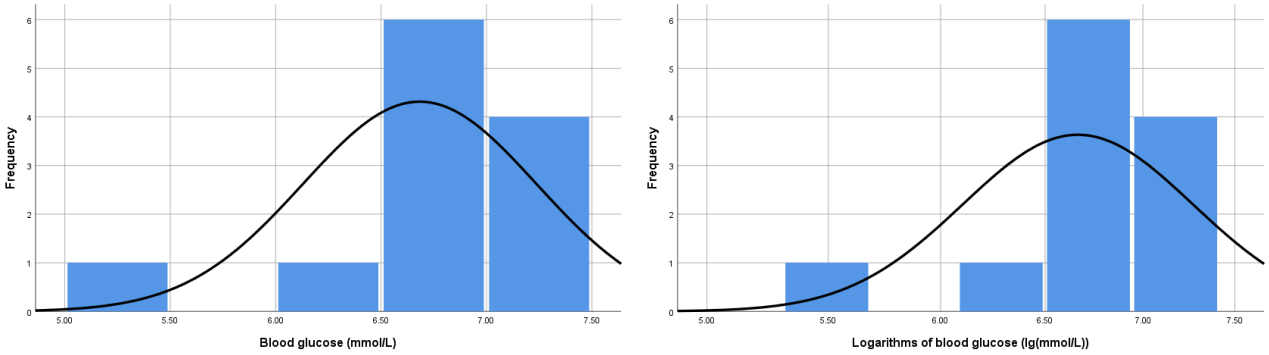
Medical Statistics
Homework 2

实验 2 班　莫润冰　20980131

1. Exercise 1



(a)　(b)

Figure 1: Histogram of blood glucose level of 12 random patients

The blood glucose level is a continous value. The histogram is higher around the center and shorter on two sides but not symmetric. The tail on the negative side is much longer than the positive side, so it is called a negative skew.

1.1 Measurement of Average

$$arithmetic\ mean : \bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = 6.683 \tag{1.1}$$

$$geometric\ mean : \bar{x} = \sqrt[n]{x_1 x_2 \cdots x_n} = 6.661 \tag{1.2}$$

$$median : M_d = 6.685 \tag{1.3}$$

*total number of patients n = 12; x_i represents the blood glucose level of i^{th} patient

The minimum value 5.31 is far from average value compared to others, so the arithmetic mean is not suitable for measuring average. The logarithmic histogram of blood glucose is not close to a normal distribution, so the geometric mean is not suitable as well. Since the histogram is taller around the center and shorter on two sides, and it is a negative skew, so median can best present the average level.

*Github repo: https://github.com/MoRunbing/Medical_Statistics
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1.2 Measurement of Variation

$$maximum\ value = 7.35 \tag{1.4}$$

$$minimum\ value = 5.31 \tag{1.5}$$

$$range = maximum\ value - minimum\ value = 2.04 \tag{1.6}$$

$$Q_3 = 7.125 \tag{1.7}$$

$$Q_1 = 6.530 \tag{1.8}$$

$$Q_3 - Q_1 = 0.595 \tag{1.9}$$

$$standard\ deviation : S = \sqrt{S^2} = 0.555 \tag{1.10}$$

$Q_3 - Q_1$ discribes sample variance better than range since it excludes those extreme values. Also, the histogram is a negative skew rather than a normal distribution, so $Q_3 - Q_1$ best reflects the variation.

2. Exercise 2

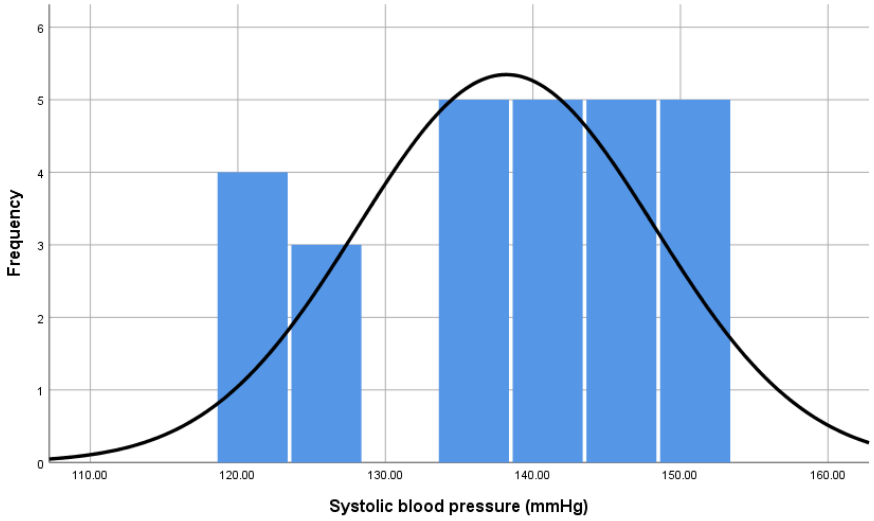

Figure 2: Histogram of systolic blood pressure (mmHg)

The systolic blood pressure is a continous value. The distribution curve is higher around the center and shorter on two sides. Also, it is symmetric, so it is close to a normal distribution. Usually, we choose arithmetic mean to reflect the average and standard deviation to reflect the variation of the data which is close to a normal distribution.

$$arithmetic\ mean : \bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = 138.185 \tag{2.11}$$

$$standard\ deviation : S = \sqrt{S^2} = 10.073 \tag{2.12}$$

*total number of collected systolic blood pressure n = 27; x_i represents the i^{th} systolic blood pressure

So the systolic blood pressure can be described as 138.185 ± 10.073 mmHg.