Math 113 section 1 -6 Instructor: M.Xiao

Announcement

- **You can get your exam score from the** TA during the recitation class.
- **If you haven't pick up the new information sheet yet, please do so before you leave today**

The second hour exam will be held on Monday, March 3 in class.

Feb. 15, 2008

Result of the First Exam

- **You can get your exam score from your recitation instructor during the lab class.**
- **Highest score 16**
- **Lowest score 0**
- **Average score 11**

A: above 14
B: above 12
C: above 10
D: above 8
F: below 7

Help Sessions

Leader: Brenda Sanders.
Meeting time:
Wednesday 4:00-5:00PM
Location: Lawson 221.

8% bonus points will be given to those students who regularly attend this help sessions.

Office Hours: Wednesday: 1:00 p.m. to 3:00 p.m.
Friday: 10 a.m. to 12 p.m.
at Woody Hall A310.

Describing Spread: The Quartiles

To calculate the quartiles:

1. Arrange the observations in increasing order and locate the median M in the ordered list of observations.

2. The **first quartile** Q_1 is the median of the observations whose position in the ordered list is to the left of the location of the overall median.

3. The **third quartile** Q_2 is the median of the observations whose position in the ordered list is to the right of the location of the overall median.

Review

Example *Calculating Quartiles*

20 25 25 27 28 31 33 34 36 37 44 50 59 85 86

First quartile **Median** **Third quartile**

5 7 10 14 18 | 19 25 29 31 33

First quartile **Median** **Third quartile**

The Five-Number Summary

The **five-number summary** of a distribution consists of the smallest observation, the first quartile, the median, the third quartile, and the largest observation, written in order from smallest to largest.

In symbols, the five -number summary is

Minimum Q_1 M Q_3 Maximum

Answer: the five -number summary of this data set is
1 4 5.5 7 10

Example

Question: List the *five-number summary* of the given data set:

7 4 10 8 5 6 4 6 1 3 7 5

Solution: **Arrange all observations in order of size:**

Minimum Median Maximum

1 3 4 4 5 5 6 6 7 7 8 10

n=12

Median $= \frac{5+6}{2} = 5.5$

The median of 1 3 4 4 5 5 is $\frac{4+4}{2} = 4$ ⇔The first quartile Q_1

The median of 6 6 7 7 8 10 is $\frac{7+7}{2} = 7$ ⇔The third quartile Q_3

An Old Exam Question

Below are the lengths (in minutes) of phone calls made on an 800 line to a business on one day. Find the five-number Summary for this data.

14, 6, 12, 19, 2, 35, 5, 4, 3, 7, 5, 8

A) 5, 8, 14, 15.5, 20
B) 2, 4, 7, 14, 35
C) 2, 4, 6, 12, 19
D) 2, 4.5, 6.5, 13, 35

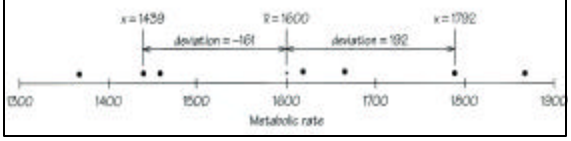
2, 3, 4, 5, 5, 6, 7, 8, 12, 14, 19, 35

Median=(6+7)/2=6.5
Q1=(4+5)/2=4.5
Q3=(12+14)/2=13
Min = 2
Max = 35

Describing Spread: The Standard Deviation

Example. Here are the metabolic rates of 7 men:
1792 1666 1362 1614 1460 1867 1439
where the units are calories per 24 hours.

The mean $\bar{x} = \frac{1792+1666+1362+1614+1460+1867+1439}{7} = 1600$



The Standard Deviation

The **variance** s^2 of a set of observations is an average of the squares of the deviations of the observations from their mean. In symbols, the variance of n observations

$$x_1, x_2, \ldots, x_n$$

is $$s^2 = \frac{(x_1-\bar{x})^2 + (x_2-\bar{x})^2 + \cdots + (x_n-\bar{x})^2}{n-1}$$

The standard deviation s is the square root of the variance s^2.

Example *Calculating the Standard Deviation*

Here are the metabolic rates of 7 men:

1792 1666 1362 1614 1460 1867 1439

The mean is $\bar{x} = \frac{1792+1666+1362+1614+1460+1867+1439}{7} = 1600$

$$(1792-1600)^2 + (1666-1600)^2 + (1362-1600)^2 + (1614-1600)^2 + (1460-1600)^2 + (1867-1600)^2 + (1439-1600)^2 = 214{,}870$$

Thus the variance is $s^2 = \frac{214{,}870}{7-1} = 35{,}811.67$

The standard deviation is the square root of the variance:

$s = \sqrt{35{,}811.67} = 189.24$ calories

Old Exam Question

Given the set of data below, find the standard deviation.

25, 16, 50, 19, 42, 37

A) 921.5
B) 184.3
C) 6.07
D) 13.58

$\bar{x} = \frac{25+16+50+19+42+37}{6} = 31.5$

$\sqrt{184.3} = 13.5751361$

$s^2 = \frac{(25-31.5)^2 + (16-31.5)^2 + (50-31.5)^2 + (19-31.5)^2 + (42-31.5)^2 + (37-31.5)^2}{6-1} = 184$

Chapter 8 Probability: The Mathematics of Chance

A phenomenon is called **random** if individual outcomes are uncertain but the long-term pattern of many individual outcomes is predictable.

Example: Coin Tossing. When one tosses a coin, Will it land heads or tails? Each outcome is random!

However, if we toss a coin 1000 times, we will get approximately 50% heads and 50% tails.

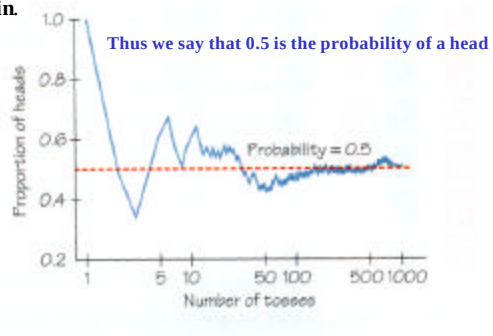
Probability

The **probability** of any outcome of a random phenomenon is the proportion of times the outcome would occur in a very long series of repetitions.

Example Coin Tossing

Let us toss a coin 1000 times. For each number of tosses from 1 to 1000, we have plotted the proportion of those tosses that gave a head.

Proportion of heads versus number of tosses in tossing a coin.



Probability Models

The **sample space S** of a random phenomenon is the set of all possible outcome

An **event** is any outcome or any set of outcomes of a random phenomenon. That is, an even is a subset of the sample space.

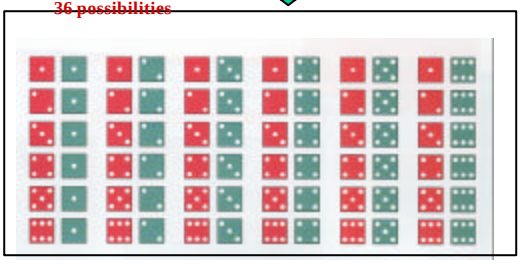
Example Coin Tossing.

The sample space S={heads, tails}
or we can write S={H, T}
H and T are events.

Example Rolling two Dice

All possible outcomes ⇔ Sample space of rolling two dice

~~**36 possibilities**~~



Probability Rules

If A is any event, we write its probability as P(A).

Rule 1. The probability P(A) of any event A satisfies

$$0 \le P(A) \le 1$$

Rule 2. If S is the sample space in a probability model, then

$$P(S) = 1$$

Rule 3. If A and B are disjoint, P(A or B)=P(A)+P(B)

Two events A and B are disjoint if they have no outcomes in common and so can never occur simultaneously.

An Old Exam Question

A sample space contains three outcomes, A, B, and C. Which of the following could be a legitimate assignment of probabilities to the outcomes?

__A. P(A)=0.2 P(B)=0.2 P(C) =0.6

__B. P(A)=0.3 P(B)=0.3 P(C)=0.3

__C. P(A)=0.2 P(B)=0.4 P(C)=0.6

P(S) is not equal to 1.

__D. P(A)=2 P(B)=3 P(C)=1 ← not a legitimate assignment

Example *Probabilities for Rolling Dice*

What is the probability of rolling 5?

Roll a 5= {  }

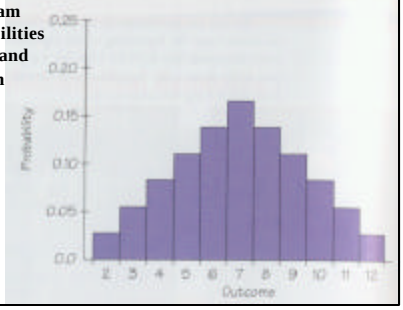
P(roll a 5) = P( ) + P( ) + P( ) + P( )

$$= \frac{1}{36} + \frac{1}{36} + \frac{1}{36} + \frac{1}{36}$$

$$= \frac{4}{36} = 0.111$$

Outcome	2	3	4	5	6	7	8	9	10	11	12
Probability	1/36	2/36	3/36	4/36	5/36	6/36	5/36	4/36	3/36	2/36	1/36

Probability histogram showing the probabilities for rolling two dice and counting the pips on the up faces.



Some Minor Changes of Homework Set 7

Original:

pp. 208-210, Problems 1-20, pp. 210-214 Problems 1, 2, 3, 5, 6, 11, ~~12, 13, 15, 18, 23~~.

Changed to:

pp. 208-210, Problems 1-20, pp. 210-214 Problems 1, 2, 3, 5, 6, 11, ~~12, 13, 15, 19, 20~~.

Answer Key For Exam 1

Blue: 1A, 2D, 3C, 4B, 5C, 6B, 7A, 8D, 9D, 10B, 11D, 12C, 13A, 14B, 15D, 16A.

Pink: 1C, 2B, 3A, 4A, 5C, 6B, 7D, 8C, 9B, 10D, 11B, 12C, 13B, 14B, 15D, 16C

Please keep the exam for preparing the final

- Instructional class meets

  Monday and Friday 8:00-8:50 AM.

- Recitation sessions meet:
  - section 1 Tues 8:00AM, NKRS 156
  - section 2 Wed 8:00AM, AG 153
  - section 4 Tues 9:00AM, NKRS 156
  - section 6 Tues 10:00AM, NKRS 156