姓名：

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# Statistics (I) Quiz 2-Date: October-30-20117

(§3-2, #29, p.145)

1. The mean of the waiting times in an emergency room is 80.2 minutes with a standard deviation of 12.5 minutes for people who are admitted for additional treatment. The mean waiting time for patients who are discharged after receiving treatment is 122.6 minutes with a standard deviation of 16.3 minutes. Which times are more variable? Why?

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$CV = \frac{S}{\bar{X}}$ 3 $CV_1 = \frac{12.5}{80.2} = 15.6\%$ 3 $CV_2 = \frac{16.3}{122.6} = 13.3\%$

2 emergency room 的等待時間變異性較大

$\therefore CV_1 > CV_2$

2. Americans spend an average of 4 hours per day online. If the standard deviation is 36 minutes, find the range in which at least 88.89% of the data will lie. Use Chebyshev's theorem. (§3-2,#35,p.145)
   a. At least what percentage of the data will fall between 2.8 and 5.2?
   b. At least what percentage of the data will fall between 1.9 and 6.1?
   c. Find the range in which at least 88.89% of the data will lie.

$\bar{X} = 4$ hr.

$S = 36$ min $= 0.6$ hr.

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a. $2.8 = 4 - k \cdot 0.6$

$5.2 = 4 + k \cdot 0.6$

$\Rightarrow k = 2$

2 $\Rightarrow$ at least $1 - \frac{1}{2^2} = 75\%$

b. $k = 3.5$

at least $91.8\%$

3. $1 - \frac{1}{k^2} = 88.89 \Rightarrow k = 3$

$\Rightarrow 4 \pm 3 \times 0.6 \Rightarrow (2.2, 5.8)$

3. Which is a better relative position, a score of 83 on a geography test that has a mean of 72 and a standard deviation of 6, or a score of 63 on an accounting test that has a mean of 55 and a standard deviation of 3.5? Why?

(§3-3, #13, p.159)

8 $Z = \frac{X - \mu}{\sigma}$

3 $Z_g = \frac{83-72}{6} = 1.83$

3 $Z_a = \frac{63-55}{3.5} = 2.28$

2 $\Rightarrow \because Z_a > Z_g$

$\Rightarrow$ accounting test 表現較佳

(§4-3, #29, p.224)

4. In a pizza restaurant, 95% of the customers order pizza. If 65% of the customers order pizza and a salad, find the probability that a customer who orders pizza will also order a salad.

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$P(\text{pizza}) = 95\%$

$P(\text{pizza \& salad}) = 65\%$

$\Rightarrow P(\text{salad} \mid \text{pizza}) = \frac{P(\text{pizza \& salad})}{P(\text{pizza})} = 68.4\%$

5. The data shown here represent the number of hour that 9 part-time employees at a toy store worked during the weeks before and after Christmas.

18

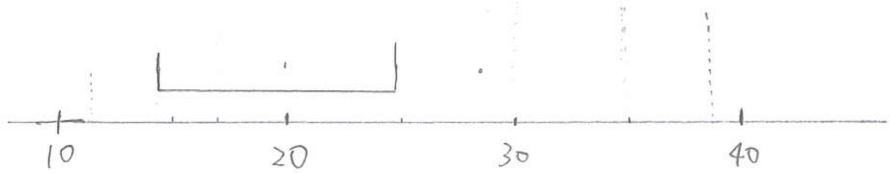
   a. Find the quartiles (Q1, Q2, and Q3) and IQR. 8
   b. Construct two boxplots. 4x2
   c. Compare the distributions of the data by using the boxplots. 2 (§3-4, #33, p.182)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Before | 38 | 16 | 18 | 12 | 30 | 35 | 35 | 24 | 33 |
| After | 26 | 15 | 12 | 24 | 28 | 14 | 18 | 22 | 20 |

sort.

| | | Q1 | Q2 | Q3 | IQR |
|---|---|---|---|---|---|
| Before: | 12, 16, 18, 24, 30, 33, 35, 35, 38 | 17 | 30 | 35 | 18 |
| After: | 12, 14, 15, 18, 20, 22, 24, 26, 28 | 14.5 | 20 | 25 | 10.5 |

$Q_1$ $Q_2$ $Q_3$



50

6. The number of highway miles per gallon of the 10 worst vehicles is shown. Find each of these.
   a. Find the percentile rank of the value of 18.
   b. Find the value corresponding to the 25th percentile.

~~12~~ ~~19~~ ~~13~~ ~~14~~ ~~15~~ ~~16~~ ~~17~~ ~~16~~ ~~17~~ ~~18~~

12, 13, 14, 15, 16, 16, 17, 17, 18, 19

(§3,#23,p.182)

2 1. sorting.

8 3 2. 18: $P_{85}$

3 3. 14

7. The distribution of the number of errors that 10 students made on a typing test is shown (population data). Find the mean and variance. (§3,#24,p.182)

| Errors | $X_m$ | Frequency |
|---|---|---|
| 0-2 | 1 | 1 |
| 3-5 | 4 | 3 |
| 6-8 | 7 | 4 |
| 9-11 | 10 | 1 |
| 12-14 | 13 | 1 |
| | | 10 |

10

$4\ \mu = \frac{1\times 1 + 4\times 3 + 7\times 4 + \cdots}{10} = 6.4$

$4\ \sigma^2 = \frac{\Sigma(X-\mu)^2}{10} = 10.44$

8. The wheel spinner shown here is spun twice (Note: 0 is considered even). (§4-1,#44,p.201)
   2 a. b. An odd number on the first spin and even number on the second spin.
   2 b. c. A sum greater than 4
   2 c. d. The same number on both spins

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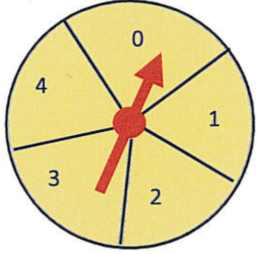


a. Sample space

(6)

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | | | | | |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

b. $\frac{2}{5} \times \frac{3}{5} = \frac{6}{25}$

c. (2,4), (3,4), (4,2) (4,4)
(1, 4), (2,3), (3,2) ...
$\frac{10}{25}$

d. $\frac{5}{25}$

9. In addition to being grouped into four types, human blood is grouped by its Rhesus (Rh) factor. Consider the figures below which show the distribution of these groups for Americans. Choose one American at random. Find the probability that the person (§4-3,#31,p.224)

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2 **a. has A+ or AB- blood**
2 ~~**b. is a universal donor, i.e., has O-negative blood**~~
3 **c. has type O blood given that the person is Rh+**

3 **d. has Rh- given that the person has type B**

| | O | A | B | AB |
|---|---|---|---|---|
| Rh+ | 37% | 34% | 10% | 4% |
| Rh- | 6 | 6 | 2 | 1 |

d. $P(Rh- \mid B) = \frac{0.02}{0.12} = 0.167$

a. $P(A+ \text{ or } AB-) = 0.34 + 0.01 = 0.35$

b. $P(O-) = 0.06$

c. $P(O \mid Rh+) = \frac{P(Rh+ \cap O)}{P(Rh+)} = \frac{0.37}{0.85} = 0.435$

**10.** The probability that a child plays one computer game is one-half as likely as that of playing two computer games. The probability of playing three games is twice as likely as that of playing two games, and the probability of playing four games is the average of the other three. Let X be the number of computer games played. Construct the probability distribution for this random variable and draw the graph. **(§5-1,#37,p.264)**

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2 $P(1) = \frac{1}{2} P_2$

2 $P(3) = 2 P_2$

2 $P_4 = \text{avg.}(P_1 + P_2 + P_3)$

$= \frac{1}{3}\left(\frac{1}{2} P_2 + P_2 + 2P_2\right)$

$\Rightarrow P_1 + P_2 + P_3 + P_4 = 1$

$\Rightarrow P_2 = \frac{3}{14}$

4 $\Rightarrow$

| X | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| P(X) | $\frac{3}{28}$ | $\frac{6}{28}$ | $\frac{12}{28}$ | $\frac{7}{28}$ |