March 16, 2009

# Elementary Statistics: Solution to Homework 5

## Solution

**Page 334 Problem 5.18:**

a) Since the distribution is skewed to the right, the mean is supposed to be bigger than the median. Therefore 45 is the mean and 40 is the median.

b) i) The mean would increase.

ii) The median would stay the same.

iii) The standard deviation would increase.

**Page 345 Problem 5.34:**

Yes, for example 1,1,2,10,10. The median is 2. The IQR is 10-1=9.

**Page 345 Problem 5.36:**

a) True

b) True

c) False

d) False (All the observations could be the same.)

e) False (The range and the IQR could be the same.)

**Page 345 Problem 5.42:**

a) Min = 440,
$Q_1$ = (560+610)/2 = 585,
Median = (680+730)/2 = 705,
$Q_3$ = (780+810)/2 = 795
and Max = 880

b) The product line $A$ has the lowest minimum sodium content which is 440.

c) The product line $A$ has the lowest $Q_1$ which is 585.

**Page 376 Problem 6.2:**

a) We find the area under the density function when $X > 1$. The area is $\frac{1}{2}(1)(\frac{1}{2}) = \frac{1}{4}$.

b) The area under the density function presents *proportion* (or *percentile* if the area starts from the left most).
The median is $X$ where the area to the left of $X$ is $\frac{1}{2}$. Hence the median is $< 1$.

**Page 377 Problem 6.4:**

(a) a score at the mean.

**Page 377 Problem 6.10:**

Refer to the table on page 406.

a) $z = 1.645$

**Note:** The area between $z = 2$ and $z = -2$ is about 95%.
However when we talk about *percentile*, we always start from the *left most*. This is why the $95th$ percentile is not 2 but less than 2.

b) $z = -1.645$
c) $z = 1.645$ and $z = -1.645$. (This time we are looking at the area between.)
d) $z = 0.763$ (approximated).

**Page 378 Problem 6.14:**

We should calculate the $z$ value first then look up the table for the percentile.

We have $z = \frac{55-62}{11} = -0.636$. We look up the table on page 406, the score is at about $26.2th$ percentile. Therefore the student passes the test.

**Page 379 Problem 6.18:**

Given $\mu = 11.4$ and $\sigma = 1.8$.

a) $z = \frac{10-11.4}{1.8} = -0.778$. After looking up the table, the proportion of men spend less than 10 minutes in the shower is 0.2177.

b) Given $Q_1$, we find the value $z$ which the area to the left of $z$ is 0.25. We look up the table on page 408, $z = -0.674$. We find X by solving the equation:

$-0.674 = \frac{X-11.4}{1.8}$.

We have $X = 1.8(-0.674) + 11.4 = 10.1868$.

c) Given the slowest 5%, we look for the $z$-score at 95 percentile. This gives $z = 1.645$ and $X = 1.8(1.645) + 11.4 = 14.361$.

**Page 397 Problem 6.54:**

a) False
b) False
c) True (since the normal distribution is symmetric.)
d) False.

**Page 397 Problem 6.56:**

a) True
b) False
c) True.