

# M 362K Post-Class Homework 7

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## 3-22

(a)

$$mean = \frac{1}{7} * (1.53 + 1.54 + 1.62 + 1.62 + 1.68 + 1.81 + 1.83) = 1.66143m$$

$$median = 1.62m$$

$$mode = 1.62m$$

$$midrange = \frac{1.53+1.83}{2} = 1.68m$$

(b)

$$min = 1.53m$$

$$max = 1.83m$$

(c)

Let  $i, j, k$  be the rank of  $Q_1$ ,  $Q_2$  and  $Q_3$  respectively

Then  $i = 0.25 * (7 + 1) = 2$ ,  $j = 0.5 * 8 = 4$  and  $k = 0.75 * 8 = 6$

Therefore  $Q_1 = 1.54$ ,  $Q_2 = 1.62$  and  $Q_3 = 1.81$

(d)

Let  $i$  be the rank of the 40th percentile number

$$\therefore i = 0.4 * 8 = 3.2$$

$$40^{th} = 1.62$$

(e)

$$range = 1.83 - 1.53 = 0.3$$

$$inter - quartile = Q_3 - Q_1 = 1.81 - 1.54 = 0.27$$

### 3-27

(a)

The probability distribution is shown below:

x	17	18	19	20	21	22	23
Pr(x)	0	0.18	0.29	0.38	0.09	0.05	0.01

$$E[X] = 17 * 0 + 18 * 0.18 + 19 * 0.29 + 20 * 0.38 + 21 * 0.09 + 22 * 0.05 + 23 * 0.01 = 19.57$$

(b)

$$E[X^2] = 17^2 * 0 + 18^2 * 0.18 + 19^2 * 0.29 + 20^2 * 0.38 + 21^2 * 0.09 + 22^2 * 0.05 + 23^2 * 0.01 = 384.19$$

$$Var[x] = E[X^2] - E[X]^2 = 384.19 - 19.57^2 = 1.2051$$

### 3-31

(a)

$$z = \frac{125-100}{16} = 1.5625$$

(b)

Let Q denote the IQ number

$$\text{Then } Q = -1.75 * 16 + 100 = 72$$

### 3-35

Let S denote the random variable that represents the sum of a pair of fair dice

The probability distribution is shown below:

$s$	2	3	4	5	6	7	8	9	10	11	12
$Pr(S = s)$	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

Let  $\mu$  denotes mean and  $\sigma$  denotes the standard deviation, COV denotes coefficient of variation

$$\mu = E[X] = 2 * \frac{1}{36} + 3 * \frac{2}{36} + 4 * \frac{3}{36} + 5 * \frac{4}{36} + 6 * \frac{5}{36} + 7 * \frac{6}{36} + 8 * \frac{5}{36} + 9 * \frac{4}{36} + 10 * \frac{3}{36} + 11 * \frac{2}{36} + 12 * \frac{1}{36} = 7$$

$$E[S^2] = 2^2 * \frac{1}{36} + 3^2 * \frac{2}{36} + 4^2 * \frac{3}{36} + 5^2 * \frac{4}{36} + 6^2 * \frac{5}{36} + 7^2 * \frac{6}{36} + 8^2 * \frac{5}{36} + 9^2 * \frac{4}{36} + 10^2 * \frac{3}{36} + 11^2 * \frac{2}{36} + 12^2 * \frac{1}{36} =$$

$$\frac{329}{6}$$

$$\sigma = \sqrt{E[S^2] - \mu^2} = \sqrt{\frac{35}{6}}$$

$$COV = 100 * \frac{\sigma}{\mu} \% = 34.5033\%$$