

38

$$\begin{aligned} \text{a) } \bar{x} &= \frac{23 + 9 + 17 + 13}{4} \\ &= 15.5 \end{aligned}$$

$$\begin{aligned} \text{b) } & 9, 13, 17, 23 \\ & \quad \underbrace{\hspace{2cm}} \\ \text{median} &= \frac{13 + 17}{2} \\ &= 15 \end{aligned}$$

$$\begin{aligned} \text{c) } \text{median} &= 15 + 5 \\ &= 20 \end{aligned}$$

$$\begin{aligned} \text{d) } \text{median} &= 2(15) \\ &= 30 \end{aligned}$$

e) the median is still 15
(median does not change).

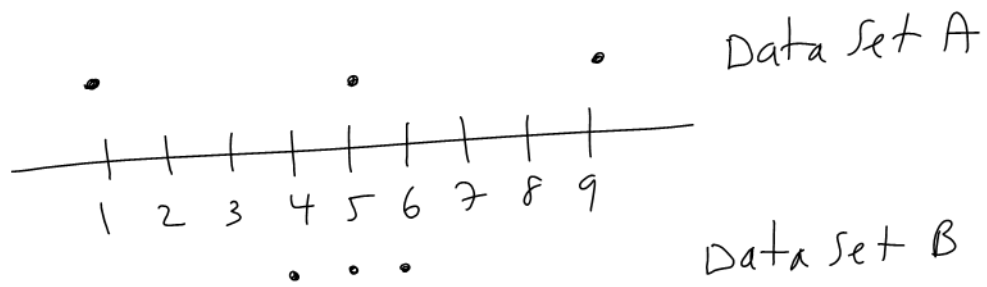
(39)

a) Each measurement was doubled.

Data Set B

b) Each measurement was increased by 2.
The standard deviations are equal.

c)



Data Set A

(40)

$$1 - \frac{1}{k^2} = 0.9375$$

$$0.0625 = \frac{1}{k^2}$$

$$k^2 = \frac{1}{0.0625}$$

$$k^2 = 16$$

$$k = 4$$

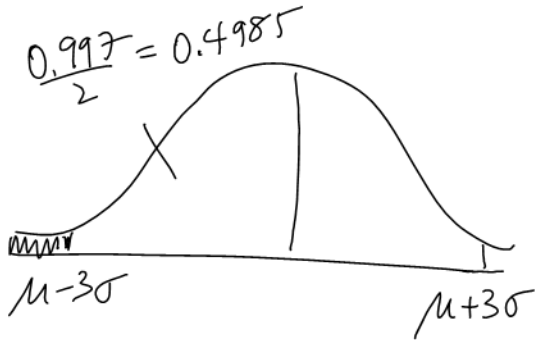
$$\begin{aligned} \mu - k\sigma &= 30 - 4(5) \\ &= 10 \end{aligned}$$

$$\begin{aligned} \mu + k\sigma &= 30 + 4(5) \\ &= 50 \end{aligned}$$

At least 93.75% of measurements
fall in the range 10 to 50.

41

$$S_2 = \mu - k\sigma$$
$$S_2 = 70 - k(6)$$
$$-18 = -k(6)$$
$$3 = k$$



Approximately 0.0015 or 0.15%

42

Math

$$z = \frac{x - \mu}{\sigma}$$
$$= \frac{80 - 70}{5}$$
$$= 2$$

Physics

$$z = \frac{x - \mu}{\sigma}$$
$$= \frac{78 - 72}{2}$$
$$= 3$$

The student did better in physics, relative to the class.

- 43) a) stratified random sample
b) 1-in-50 systematic random sample
c) simple random sample
d) cluster sample

- 44) a) experimental
b) observational

45) The problem is using mean instead of median.
(There could be a few very expensive houses.)

46 a) $10 + 26 = 36$ symbols

$$36^4 = 1,679,616$$

b) # with no letters = 10^4

$$\begin{aligned} & \# \text{ with at least one letter} \\ &= \text{total \#} - \# \text{ with no letters} \\ &= 36^4 - 10^4 \\ &= 1,669,616 \end{aligned}$$

47 a) $\frac{1}{1} \times \frac{10}{1} \times \frac{10}{1} = 100$

b) $\frac{10}{1} \times \frac{1}{1} \times \frac{1}{1} = 10$

c) $\frac{1}{1} \times \frac{1}{1} \times \frac{1}{1} = 1$

d) $n(A \text{ or } B) = n(A) + n(B) - n(A \text{ and } B)$

$$\begin{aligned} & n(\text{start with 8 or end with 13}) \\ &= n(\text{start with 8}) + n(\text{end with 13}) \\ & \quad - n(\text{start with 8 and end with 13}) \\ &= 100 + 10 - 1 \\ &= 109 \end{aligned}$$

48

$$P(E) = \frac{n(E)}{n_{\text{total}}}$$

$$\begin{aligned} n_{\text{total}} &= 312 + 138 + 120 + 80 + 98 + 52 \\ &= 800 \end{aligned}$$

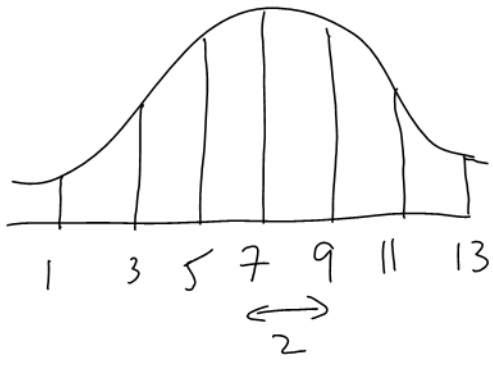
$$\text{a) } \frac{98 + 52}{800} = 0.1875$$

$$\text{b) } \frac{120 + 80 + 98 + 52}{800} = 0.4375$$

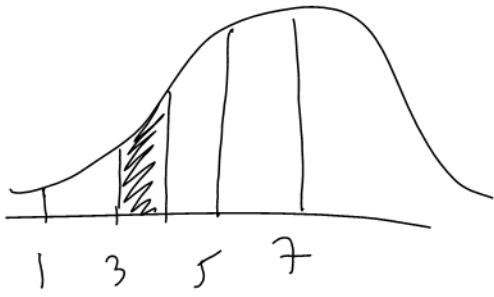
$$\text{c) } \frac{80}{800} = 0.1$$

$$\text{d) } \frac{120 + 80 + 138 + 52}{800} = 0.4875$$

49



a)



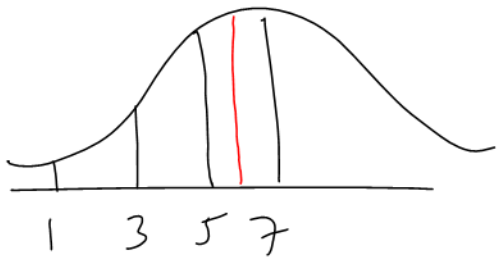
Strictly between 0% and 50%

b)



At least 50%

c)



0%

50

a)

$$\begin{aligned}\mu &= \bar{x} \pm z \frac{\sigma}{\sqrt{n}} \\ &= 70.2 \pm 1.645 \left(\frac{8.1}{\sqrt{100}} \right) \\ &= 70.2 \pm 1.3\end{aligned}$$

90% confidence interval for μ :
 $68.9 \leq \mu \leq 71.5$ decibels

b) The confidence interval would get narrower because the term $z \frac{\sigma}{\sqrt{n}}$ would get smaller.