

Before we begin the new unit,  
are there any questions from last day's review homework?

pp.158-159 #1 to 4, 5a\*,5b, 6 to 9\*, 10

7.8.9

**\*In #5a the text forgot to say in the Answers section that there is measurement bias!**

**Do you know why there is measurement bias in 5a?**

**\*9 variance =204.49, std. dev.=14.3**

p.158

7. A nut and a washer are to fit onto the end of a bolt. The centre of the washer must have a mean diameter of 1.5 cm. The variance of the washers is 0.01 cm. The centre of the nut must have a diameter of 1.15 cm, with a standard deviation of 0.01 cm. Assume the diameters are distributed normally.

- a) What is the standard deviation of the washers?
- b) Give the range of centre diameters necessary for the washers to be within two standard deviations of the mean.
- c) Give the range of centre diameters necessary for the nuts to be within two standard deviations of the mean.
- d) Why do the nuts and the washers have different standard deviations? Explain.



Washer

Nut

diameter = 1.5 cm

diameter = 1.15 cm

Variance = 0.01 cm

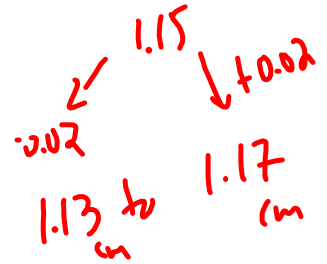
std. dev. = 0.01 cm

a)  $\text{std dev} = \sqrt{\text{variance}}$   
 $= \sqrt{0.01}$   
 $= 0.1 \text{ cm}$

c)  $\text{std} = 0.02$

Range

$\therefore 2 \text{ std. dev} = (0.1) \times 2$   
 $= 0.2 \text{ cm}$



$-0.2 \text{ cm}$       $1.5 \text{ cm}$       $+0.2 \text{ cm}$   
 $1.3 \text{ cm}$                       $1.7 \text{ cm}$

$\therefore \text{Range} = 1.3 \text{ cm} + 1.7 \text{ cm}$

p.159

8. A large doughnut chain recorded the opening week sales for eight new shops  
 \$37 500, \$42 300, \$58 800, \$31 300,  
 \$41 800, \$37 100, \$63 200, \$58 000
- a) Find the range, the mean, the median, and the mode for the data.
- b) Are sales at the new shops likely to increase or decrease after the opening week? Explain.

31 300, 37 100, 37 500, 41 800, 42 300, 58 000, 58 800, 63 200

$$\begin{aligned} \text{a) Range} &= 63\,200 - 31\,300 \\ &= 31\,900 \end{aligned}$$

$$\begin{aligned} \text{Median} &= \frac{41\,800 + 42\,300}{2} \\ &= 42\,050 \end{aligned}$$

$$\text{Mean} = \frac{+ + + + + + + +}{8}$$

$$= \frac{362\,000}{8}$$

$$= 45\,250$$

Mode = No Mode

p.159

9. A manufacturer of rechargeable batteries tests 10 batteries at random and records the time it takes, in minutes, to drain each battery after a full charge has been applied.

195, 203, 177, 186, 191,  
225, 216, 202, 197, 218

Find the range, the variance, and the standard deviation of the data.

$$\begin{aligned} \text{Range} &= 225 - 177 \\ &= 48 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= \frac{195 + 203 + 177 + 186 + 191 \\ &\quad + 225 + 216 + 202 + 197 + 218}{10} \\ &= \frac{2010}{10} \\ &= 201 \end{aligned}$$

195		195	= -6	36
203		203	-201 = 2	4
177		177	-201 = -24	576
186		186	-201 = -15	225
191		191	-201 = -10	100
225		225	-201 = 24	576
216		216	-201 = 15	225
202		202	-201 = 1	1
197		197	-201 = -4	16
218		218	-201 = 17	289

Total 2048

$$\text{Variance} = \frac{2048}{10}$$

$$= 204.8$$

$$\text{Std. Dev.} = \sqrt{204.8}$$

$$= 14.31$$