25.3

10. Melting point (°C) of aluminum 660, 667, 654, 663, 662

$N=5$

$$E[x] = \frac{660+667+654+663+662}{5} = 661.2 = \mu$$

$$Var[x] = E[(x - E[x])^2]$$

$$= \frac{(-1.2)^2 + (5.8)^2 + (-7.2)^2 + (1.8)^2 + (0.8)^2}{5}$$

$$= \frac{1.44 + 33.64 + 51.84 + 3.24 + 0.64}{5}$$

$$= \frac{90.8}{5} = 18.16$$

$$\sigma = \sqrt{Var[x]} = \sqrt{18.16} = 4.26 \qquad \sigma_n = \frac{\sigma}{\sqrt{N}} = \frac{4.26}{\sqrt{5}} = 1.9$$

2.326 for 99% confidence interval

$\mu \pm 2.326\,\sigma_n$

$661.2 \pm 4.43 = [656.77, 665.63]$

if we remove 654

$$E[x] = \mu = \frac{660+667+662+663}{4} = 663 \qquad N=4$$

$$Var[x] = \frac{3^2 + 4^2 + 1^2 + 0}{4} = \frac{9+16+1}{4} = \frac{26}{4} = 6.5$$

$$\sigma = \sqrt{Var[x]} = \sqrt{6.5} = 2.55 \qquad \sigma_n = \frac{\sigma}{\sqrt{N}} = \frac{2.55}{2} = 1.275$$

$\mu \pm 2.326\,\sigma_n$

$663 \pm 2.326(1.275) = 663 \pm 2.97$

$= [660, 666]$