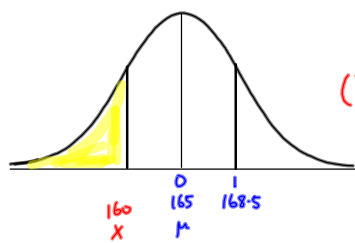


31. The heights of a large group of female students are normally distributed with a mean of 165cm and a standard deviation of 3.5 cm. A student is selected at random from this group.

(i) Find the probability that she is less than 160 cm in height.

The Drama teacher is looking for a student with a height between 168 cm and 174 cm for a part in a school play.

(ii) Find the proportion of students from this group that would satisfy these conditions.



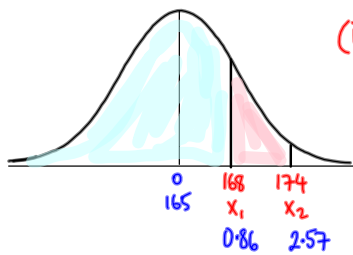
$$\sigma = 3.5 \text{ cm}$$

$$(i) \quad z = \frac{x - \mu}{\sigma} = \frac{160 - 165}{3.5} = \frac{-5}{3.5} \approx -1.43$$

$$P(z = 1.43) = 0.9236$$

$$P(z = -1.43) = 1 - 0.9236 = 0.0764$$

$$\text{or } 7.64\%$$



$$(ii) \quad z = \frac{x - \mu}{\sigma} \quad z_1 = \frac{x_1 - \mu}{\sigma} = \frac{168 - 165}{3.5} = 0.86$$

$$z_2 = \frac{x_2 - \mu}{\sigma} = \frac{174 - 165}{3.5} = 2.57$$

$$P(z = 0.86) = 0.8051$$

$$P(z = 2.57) = 0.9949$$

$$P(0.86 \leq z \leq 2.57) = 0.9949 - 0.8051 = 0.1898 = 18.98\%$$