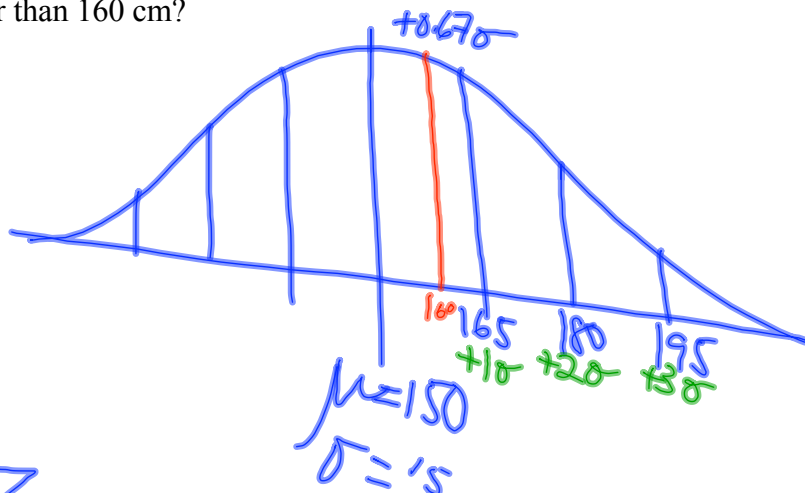


3.4 Standard Normal Distribution

Example 1:

The heights of students are normally distributed with a mean of 150 cm and a standard deviation of 15 cm. What percentage of students have a height greater than 160 cm?



$$Z = \frac{X - \mu}{\sigma} \quad \text{Z-Score}$$

$Z \rightarrow$ # of standard deviations to the left or right of the mean.

$X \rightarrow$ Value you are working with

μ - mean

σ = SD.

$$Z = \frac{160 - 150}{15}$$

$$Z = 0.67$$

always
to 2 decimal places.

Example 2:

The annual mean daily temperature for Calgary is 3.5°C with a standard deviation of 6.75. The annual mean daily temperature for Regina is 3.1°C with a standard deviation of 10.6. If the temperature today was 12°C in Regina and 11°C in Calgary, which city had the better than average day with respect to temperature?

Calgary

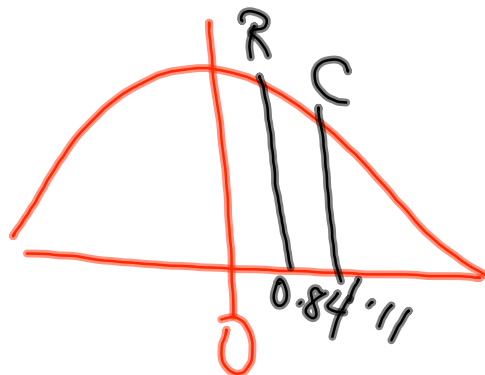
$$Z = \frac{11 - 3.5}{6.75}$$

$$Z = 1.11$$

Regina

$$Z = \frac{12 - 3.1}{10.6}$$

$$Z = 0.84$$



Example 3:

The results of an exam are found to be normally distributed with a standard deviation of 8.3. Michelle's score of 75 on the exam corresponds to a z-score of 1.35. The mean of the exam is _____?

$$Z = \frac{x - \mu}{\sigma}$$

$$1.35 = \frac{75 - \mu}{8.3}$$

$$1.35 \cdot (8.3) = 75 - \mu$$

$$(1.35)(8.3) - 75 = -\mu$$

$$\mu = 63.8$$

Example 4:

A mark of 73 on an exam translates to a z-score of 1.6. If the mean is 64 then the standard deviation to the nearest tenth is _____?

$$1.6 = \frac{73 - 64}{\sigma}$$

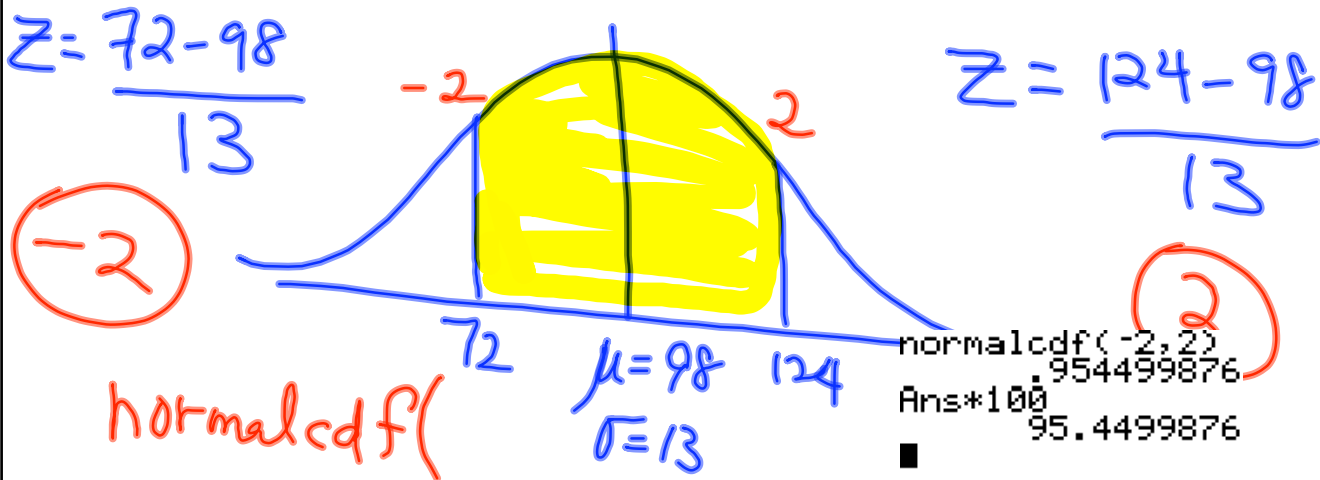
$$\sigma = \frac{73 - 64}{1.6}$$

$$\sigma = 5.625$$

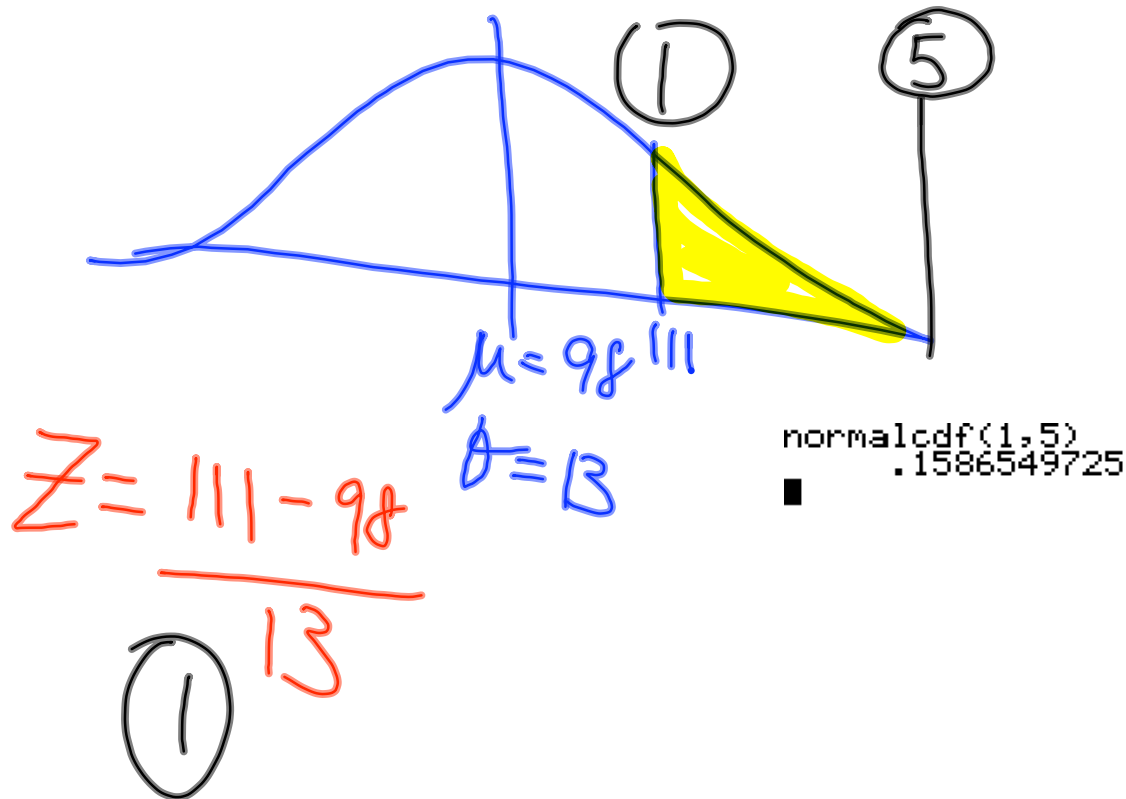
Example 5:

The Bright light Company tested a new line of light bulbs and found their lifetimes to be normally distributed with a mean life of 98 hours and a standard deviation of 13 hours.

a) What percent of the light bulbs lasted between 72 hours and 124 hours



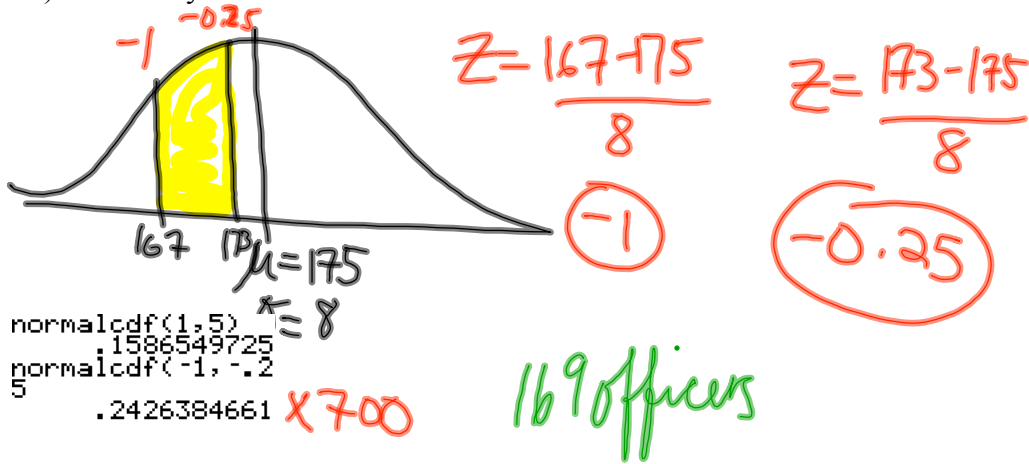
b) What percent of the light bulbs will last more than 111 hours?



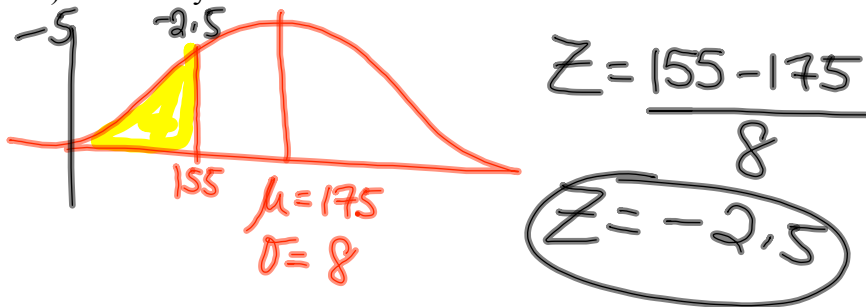
Example 6:

The heights of 700 officers from a police force are normally distributed with a mean of 175 cm and a standard deviation of 8 cm.

a) How many officers are between 167 and 173 cm?



b) How many officers are below 155 cm?



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