Question 19 **(16 marks)**

The volume of water used by the SavaDaWater company to top up an ornamental pool has been observed to be normally distributed with mean $\mu = 175$ litres and standard deviation $\sigma = 15$ litres.

The ornamental pool is topped up 50 times. Determine the probability that the:

(a) sample mean volume will be between 173 and 177 litres. (3 marks)

(b) total volume of water used is less than 8.96 kilolitres. (3 marks)

Water is a scarce commodity and accuracy is required. The pool is topped up 50 times and the sample mean obtained is denoted by $\overline{W}$.

(c) If it is required that $P(a \leq \overline{W} \leq b) = 0.99$, then determine the values of a and b, each correct to 0.1 litres. (3 marks)

(d) If the probability for the mean amount of water used differs from μ by less than five litres is 96%, find n, the number of waterings that need to be measured. (3 marks)

A rival company called WolliWorks takes over the watering of the ornamental pool. Over 36 consecutive days, it was observed that the WolliWorks company used a total of 6.57 kilolitres. The standard deviation for the 36 days was also 15 litres.

A representative from the SavaDaWater company states that 'WolliWorks are using significantly more water than we did when we were filling this pool. They are wasting water'.

(e) Perform the calculations necessary to comment on this claim. (4 marks)