

## Worksheet 2

Sometimes we may need to choose between two sampling plans by comparing measures such as variance, bias and accuracy. Here we are interested in estimating  $\mu$ , the population mean.

For purposes of studying sampling distributions, assume that all population values are known:  $y_1 = 98, y_2 = 109, y_3 = 154, y_4 = 133, y_5 = 190, y_6 = 175$ . Out of the  $N = 6$  total possible values to sample from, we will choose  $n = 3$ .

**Plan 1:** The following eight possible samples may be chosen with equal probability:  $\{1,3,5\}$ ,  $\{1,3,6\}$ ,  $\{1,4,5\}$ ,  $\{1,4,6\}$ ,  $\{2,3,5\}$ ,  $\{2,3,6\}$ ,  $\{2,4,5\}$ ,  $\{2,4,6\}$

**Plan 2:** The following three samples may be chosen:  $\{1,4,6\}$ ,  $\{2,3,6\}$ ,  $\{1,3,5\}$  with respective probabilities  $\delta = (.25, .5, .25)$ .

Answer the following questions:

- a) What is the value of  $\mu$ ?
- b) For each sampling plan, find: i)  $E[\bar{y}]$ , ii)  $V[\bar{y}]$ , iii)  $\text{Bias}(\bar{y})$ , iv)  $MSE(\bar{y})$ , where  $\bar{y}$  is the mean of sample values.
- c) Which sampling plan do you think is better, and why?