Module 3 Sampling

1. Suppose we know that the IQ scores of all incoming college freshman are normally distributed with standard deviation of 15. We have a simple random sample of 100 freshmen, and the mean IQ score for this sample is 120. Find a 90% confidence interval for the mean IQ score for the entire population of incoming college freshmen.

Solution: We have standard deviation $\sigma = 15$, sample size $n = 100$ and sample mean $\bar{x} = 120$.

The critical value for confidence level of 90% is given by $z^* = 1.645$.
A 90% confidence interval for the populations mean IQ score is

$$120 \pm 1.645 \times \frac{15}{\sqrt{100}} = (117.5325, 122.4675)$$

2. The 2012-2013 SASE scores of the 33 random students from College of Science and Mathematics (CSM) of MSU-IIT were recorded: 9. The population of these scores are believed to be normally distributed with 6.8 standard deviation. Determine and interpret the 95% and 99% confidence interval of the population mean.
Solution: sample mean $= (84 + 93 + 101 + 86 + 82 + 86 + 88 + 94 + 89 + 94 + 93 + 83 + 95 + 86 + 94 + 87 + 91 + 96 + 89 + 79 + 99 + 98 + 81 + 80 + 88 + 100 + 90 + 100 + 81 + 98 + 87 + 95 + 94)/33 = 90.33$
The critical value for confidence level of 90% is given by $z^* = 1.645$.
The critical value for confidence level of 95% is given by $z^* = 1.96$.
A 90% confidence interval for the population mean is

$$90.33 \pm 1.645 \times \frac{6.8}{\sqrt{33}} = (88.39, 92.28)$$

A 95% confidence interval for the population mean is

$$90.33 \pm 1.96 \times \frac{6.8}{\sqrt{33}} = (88.01, 92.65)$$