

STAT 3355 – HW 6

Yebom Kim

Problem 1

- a. The mean of the sample distribution of the sample mean: 8.2 minutes.
The standard deviation of the sampling distribution of the sample mean is .1291 minutes.
($1/\sqrt{60}$)
- b. 90th percentile: 1.2816.
The sample mean time for app engagement is $8.2 + 1.2816(.1291) = 8.364$, which means 90% of the sample means for time spent on app engagement will be below 8.364 minutes.
- c. Between ± 1 standard deviation: 0.6827, which means that 68.27% of the sample means will fall within the range of 7.071 to 9.329 minutes.
Between ± 2 standard deviations: 0.9545, which means that 95.45% of the sample means will fall within the range of 6.942 to 9.458 minutes.
Between ± 3 standard deviations: 0.9973, which means that 99.73% of the sample means will fall within the range of 6.813 to 9.587 minutes.
- d. The empirical rule can be used to estimate the probabilities without using any calculations. According to the empirical rule, approximately:
68% of the sample means will fall within 1 standard deviation from the population mean
95% of the sample means will fall within 2 standard deviations from the population mean

Problem 2

- a. Probability density function: $f(x) = \frac{1}{2} * \exp(-x/2)$, for $x > 0$ and where x is the excee data usage in GB. $P(X > 2.5) = \int_{2.5}^{\infty} f(x) dx$
 $\int_{2.5}^{\infty} (1/2) * \exp(-x/2) dx = \exp(-2.5/2)$ is approximately 0.2865
- b. We can standardize the sample mean as $Z = (x - \mu) / (\sigma/\sqrt{n}) = (2.5-2) / (2/\sqrt{80})$ is around 3.58
- c. They have different values because they are based on the random variables.