

1. You will attempt to replicate our sampling distribution examples we played with in class. You will use the Gamma distribution $X \sim \Gamma(shape = 3, scale = 7)$. Since there will be lots of plots here, look up the chunk options for RMarkdown documents that set figure width and height. You are required to at least make an effort to not waste paper – shrink you plots to a reasonable size.
 - (a) Randomly generate $N = 10$ observations from the population distribution, $\Gamma(shape = 3, scale = 7)$.
 - (b) Make an appropriate plot from these randomly generated data.
 - (c) Describe the population distribution.
 - (d) Calculate $R = 999$ sample statistics $T_r(\mathbf{X})$ for $r = 1, \dots, R$. You choose $T(\cdot)$.
 - (e) Make an appropriate plot your samples T_r , to display your approximated sampling distribution for T .
 - (f) Describe the sampling distribution for T .
 - (g) Repeat steps a through f for $N = 100, 1000$.
 - (h) Does the Central Limit Theorem make the sampling distribution look more normal when the sample size is smaller or larger?
 - (i) Make the population more skewed and repeat steps a through f . What affect did the extra skew have on the sampling distribution relative to the sample size?