Confidence Intervals for Mean for Exponential Distribution

$$P(c_1 < \chi^2_{2n} < c_2) = \gamma$$

$$c_2 = \left(\chi^2_{2n}\right)^{-1}\left[\tfrac{\gamma+1}{2}\right] \quad \text{and} \quad c_1 = \left(\chi^2_{2n}\right)^{-1}\left[\tfrac{1-\gamma}{2}\right]$$

$$P\left(2\textstyle\sum X_i/c_2 < \mu < 2\sum X_i/c_1\right) = \gamma$$

Expected length is $\mathrm{E[L]} = 2n\mu\left(\frac{1}{c_1} - \frac{1}{c_2}\right)$.

Attempt to optimize c_1 and c_2 in both cases above using simple grid search. Start with c_1 and c_2 as defined above, then decrease both probabilities by 0.0001 until $\left[\frac{1-\gamma}{2}\right]$ is 0, then pick c_1 and c_2 with smallest confidence interval. For example for $\gamma = 0.95$ this will give 250 (0.025/0.0001) pairs of c_1 and c_2 to search. Among those 250 pairs the one that has the smallest $c_2 - c_1$ is selected.