MATH-2205-A-ICA-4

Solve all the following problems.

1. Let $\boldsymbol{X}$ equal the dirt in kg per day produced by a typical family in Dhaka city. Suppose the standard deviation of $\boldsymbol{X}$ is $\mathbf{2}$ kg. To estimate the mean $\boldsymbol{\mu}$ of $\boldsymbol{X}$, an agency took a random sample of $\mathbf{100}$ families and found they produced $\frac{\mathbf{1}}{\mathbf{2}}$ metric ton of dirt every day. Find an approximate $\mathbf{95}\%$ confidence interval for $\boldsymbol{\mu}$.

2. A company produces mosquito killing bat whose average lifetime is $\mathbf{360}$ days and average variation $\mathbf{60}$ days. It is claimed that in a newly developed process the mean lifetime can be increased. Design a decision rule for **100** samples with $\mathbf{0.1}$ significance. If the new process has increased the mean lifetime to $\mathbf{375}$ days, assuming a sample of $\mathbf{120}$ bulbs with estimated lifetime $\mathbf{370}$ days, find $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$. Again, a sample of $\mathbf{80}$ cables is tested and it is found that the average lifetime is $\mathbf{368}$ days. Find the $\boldsymbol{p}$-value of the test.