An economist wishes to estimate the average family income in a certain population. The population standard deviation is known to be $4,500, and the economist uses a random sample of size = 225.

1. What is the probability that the sample mean will fall within $800 of the population mean?
2. What is the probability that the sample mean will exceed the population mean by more than $600.

Please describe in detail, as well as how the z-table values are determined.

The article “Reliability of Domestic Waste Biofilm Reactors” (*J. of Envir. Engr.,* 1995: 785-790) suggests that substrate concentration (mg/cm^3) of influent to a reactor is normally distributed with μ = 0.30 and σ = 0.06.

* 1. What is the probability that the concentration exceeds 0.40?
  2. What is the probability that the concentration is at most 0.25?
  3. How would you characterize the largest 10% of all concentration levels?

Please describe in detail.