Central Limit Theorem Worksheet

KEY TERMS

- **Central Limit Theorem:** *a theorem used to estimate proportions in a population for which if three basic conditions are met, the sampling distribution of the sample proportion is close to the Normal Distribution*
  - **Condition 1:** Sampling is random & independent
  - **Condition 2:** Large sample: The sample size is large enough that the sample expects at least 10 successes (yes) & 10 failures (no).
    - Successes: $np\hat{} \geq 10$
    - Failures: $n(1-p\hat{}) \geq 10$
  - **Condition 3:** Big population: If sampling is done without replacement the population must be at least 10 times larger than the sample size.
    - $N \geq 10n$

Gould, R., & Ryan, C. N. (2015). Introductory statistics: Exploring the world through data. Pearson.

During June 2020, 2,395 salinity measurements were taken in the Mokauea loko iʻa. From an analysis of this data, approximately 33% of the salinity measurements were greater than 22.5 PSU. Suppose you examined 150 random data points from this set of data. Find the approximate probability that more than 20% of the sample will be greater than 22.5 PSU.

With the above information, fill in the following:

- **N =**
- **n =**
- **p =**
- **$p\hat{}$ =**

With this information, perform the Central Limit Theorem Conditions Check.

Condition 1: Random & independent

Condition 2: Sample Size

Condition 3: Population Size

The above data is real data collected from research at Mokauea loko iʻa.
Additional Mokauea loko iʻa data can be explored here: http://grogdata.soest.hawaii.edu/

Is the distribution Normal? If so, find the problem's Standard Error. Round to the nearest thousandth.

With the Standard Error found, fill in the blanks: N(_____ , _____)

Now, Find the approximate probability that more than 20% of the sample will be greater than 22.5 PSU. Interpret your answer as a percentage.