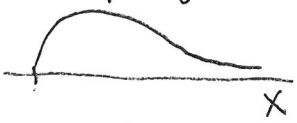
(1.) 1. Conducting studies and collecting data
2. Summarizing and analyzing data to extract information
3. Making decisions and reaching conclusions based on data

(2.) a.) quantitative
b.) categorical
c.) Filter C. Amount of impurities remaining in water, for the most part, is lower than the other filters.

(3.) X = weight loss; may have a skewed-to-right distribution.



A: Sample median = 15
B: $\bar{X} = 15$

Most likely many people lose only a few pounds and only a few people lose a lot of weight. This suggests that weight loss distribution is skewed to the right so $\bar{X}$ is pulled to the right. Clinic A would be preferred because more people would be apt to loss a significant amount of weight.

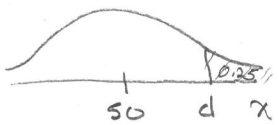
(4.) set 1: 9, 9, 10, 11, 11 $\bar{x} = 10, s^2 = 1$
set 2: 7, 7, 10, 13, 13 $\bar{x} = 10, s = \sqrt{9} = 3$, Range = 6

(5.) X = # seeds that germinate out of n. $X \sim$ binomial(10, 0.8)

$$P(X=9) = \frac{10!}{9!\,1!}(0.80)^9(0.20)^1 = 10(0.80)^9(0.20) = 0.2684$$

(6.) a.) X = tree diameter (cm). Assuming that $X \sim N(50, 12)$,
$P(X \le 44) = pnorm(44, 50, 12) = 0.3085$

b.)



Find x such that $P(X \le x) = 0.75$
$qnorm(0.75, 50, 12) = 58.09$ cm

(7.) a.) For a population having mean μ and (finite) standard deviation σ, if $n > 30$, then the sampling distribution of $\bar{X}$ is well approximated by a normal distribution with mean μ and standard deviation $\frac{\sigma}{\sqrt{n}}$.
i.e., $\bar{X} \overset{approx}{\sim} N(\mu, \frac{\sigma^2}{n})$

b.) If the objective of the study is make inferences about μ and $\bar{X}$ is used to estimate μ, the sampling distribution provides information about $\bar{X}$'s mean, variability, and the probability that $\bar{X}$ varies about μ. As n increases, the variance of $\bar{X}$ decreases.

(8.) a.) $\bar{X} = 60$

b.) It appears that $\bar{x}^*$'s distribution is bell-shaped so that ± one standard from the center should capture about 68% of the values. i.e. $\frac{136}{200} = 0.68$ and ≈ 136 values are trapped within ± 6 or 7 units from the center. i.e., calculation-wise, $\hat{\sigma}_{\bar{x}} \approx 6.8$.

c.) $\frac{190}{200} = 0.95$ so ≈ 190 values are trapped in the CI.
Based on plot, consider, say, (46, 74).

d.) ii)

e.) iii)

(9.) a.) $\mu_{\bar{x}} = \mu = 2.1$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{0.4}{\sqrt{64}} = \frac{0.4}{8} = 0.05$

b.) Using CLT, $\bar{X} \overset{\text{approx}}{\sim} N(2.1, 0.05)$

c.) $P(1.9 \leq \bar{X} \leq 2.3) = \text{pnorm}(2.3, 2.1, 0.5) - \text{pnorm}(1.9, 2.1, 0.05)$

$= 0.9999367 - 3.167124 \times 10^{-5}$

$\simeq 0.9999$