STAT511HW2

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1) a.

    P(Z <= 0.57) = 0.7156612

   b.

    P(Z <= -0.32) = 0.3744842

   c.

    P(Z >= 2.10) = 0.01786442

   d.

    P(-0.32 <= Z <= 1.55) = 0.5649451

   e.

    z = -0.4399132

   f.

    z = 0.2567134

2) Y ~ N (μ = 6, s = 0.8)

   a.

    P(Y <=7) = 0.8943502

   b.

    P(Y > 5.4) = 0.7733726

   c.

    P(6<=Y<=7.2) = 0.4331928

   d.

    y = 6.829147

3)

   a.

    df=25, P(T>1.708) = 0.05

   b.

    df=9, P(-t<T<t) = 0.95, t = 2.262

   c.

    df=25, P(T>1.708) = 0.05, t = -1.298714

4)

   a.

As the distribution of Y is skewed, empirical rule for normal distribution can't be applied. In this case, Chebyshev's rule should be applied for determining 75% interval.

From Chebyshev's rule,

$P(\mu - 2\frac{\sigma}{\sqrt{n}} \le \bar{y} \le \mu + 2\frac{\sigma}{\sqrt{n}}) = 0.75$

Or, $P(90-2 \le \bar{y} \le 90+2) = 0.75$

Or, $P(88 \le \bar{y} \le 92) = 0.75$

Where $\bar{y}$ is the sample mean of n=100 samples.

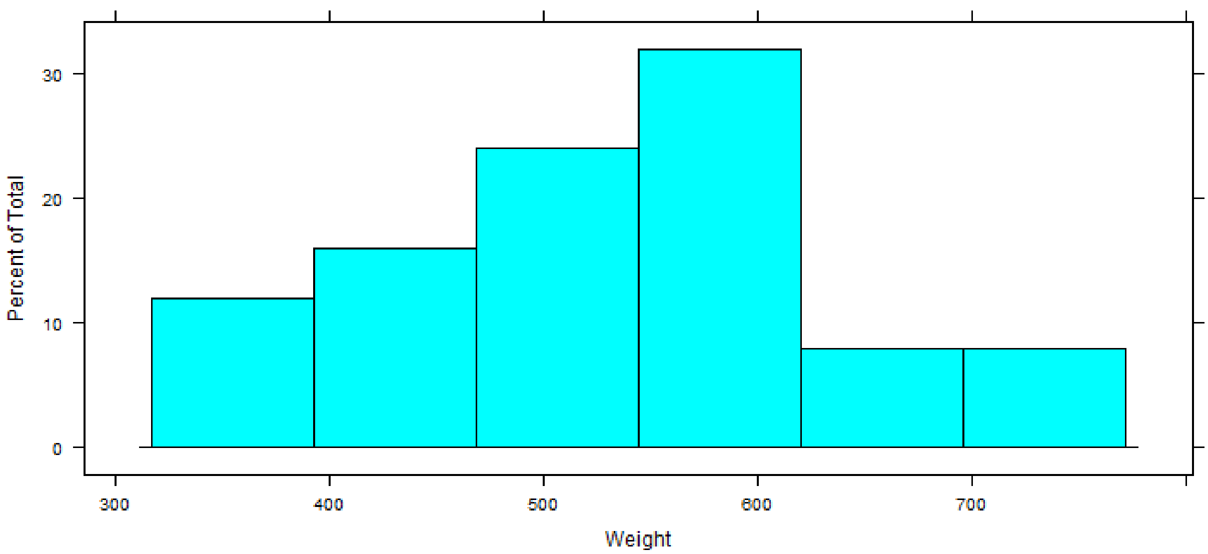
   b.

According to the Central Limit Theorem, the distribution of $\bar{Y}$ is close to normal as n is large (n=100). So the shape of the distribution will follow normal distribution (bell shaped curve) [$\bar{Y} \sim (\mu, \frac{\sigma}{\sqrt{n}})$]

Mean = μ = 90
Standard deviation s = $\frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{100}} = 1$

5)

a.



Sample mean $\bar{y}$ = 526.12

Sample sd , s= 113.7279

b.

From the histogram, the sample data looks like a normal distribution. So from the empirical rule, 95% (α = 0.05) confidence interval for μ is = $(\bar{y} \pm t_{\alpha/2} \frac{s}{\sqrt{n}})$
Now, $t_{\alpha/2} = t_{0.05/2} = t_{0.025}$, and df = n-1 = 25-526.121 = 24.
From Student's t-distribution, $t_{0.025}$ for df , $t_{\alpha/2,\, n-1} = t_{0.025,\, 24}$ = 2.064.
So, confidence interval = $(\bar{y} \pm t_{\alpha/2} \frac{s}{\sqrt{n}})$ = (526.12 ± (2.064) $\frac{113.7279}{\sqrt{25}}$ = (526.12 ± 46.95) = (479.17 , 573.07)

c.

We can be 95% confident that population mean seed weight is contained in the 95% confidence interval (479.17 , 573.07).

d.

For $H_0 : \mu = 500$

$H_A : \mu \neq 500$

Test Statistic TS, $t = \frac{\bar{y}-500}{s/\sqrt{n}} = \frac{526.12-500}{113.7279/\sqrt{25}} = 1.148.$

Now , $|t| \ngtr t_{\alpha/2,\, n-1}$ as $1.148 < 2.064$.

So the test statistics does not fall into the rejection region.

This means, we fail to reject the hypothesis H_0. This means that there is 95% chance that the confidence interval will contain the population mean $\mu = 500$.