Week 10, 3/19 - 3/23, Chapter 8: #8, #14, #26, #30

8-8 95% Two-sided CI on the breaking strength of yarn: where $\bar{x} = 98$, $\sigma = 2$, n=9 and $z_{0.025} = 1.96$

$$\bar{x} - z_{0.025}\sigma / \sqrt{n} \le \mu \le \bar{x} + z_{0.025}\sigma / \sqrt{n}$$

$$98 - 1.96(2) / \sqrt{9} \le \mu \le 98 + 1.96(2) / \sqrt{9}$$

$$96.7 \le \mu \le 99.3$$

8-14 95% Confident that the error of estimating the true mean life of a 75-watt light bulb is less than 5
hours.

For $\alpha = 0.05$, $z_{\alpha/2} = z_{0.025} = 1.96$, and $\bar{\sigma} = 25$, E=5

$$n = \left(\frac{z_{a/2}\sigma}{E} \right)^2 = \left(\frac{1.96(25)}{5} \right)^2 = 96.04$$

Always round up to the next number, therefore $n = 97$

8-26 95% confidence interval on mean peak power

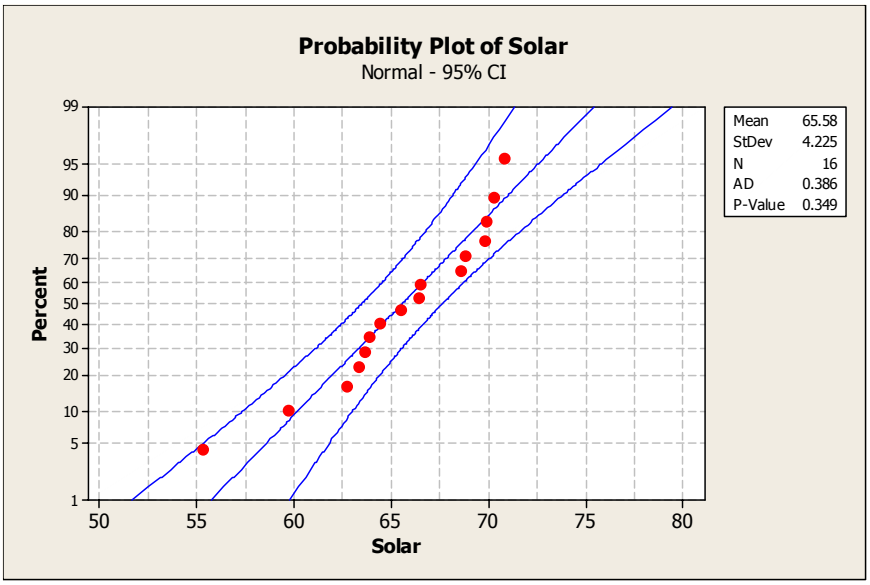
$$n = 7 \quad \bar{x} = 315 \quad s = 16 \quad t_{0.025,6} = 2.447$$

$$\bar{x} - t_{0.025,6}\left(\frac{s}{\sqrt{n}} \right) \le \mu \le \bar{x} + t_{0.025,6}\left(\frac{s}{\sqrt{n}} \right)$$

$$315 - 2.447\left(\frac{16}{\sqrt{7}} \right) \le \mu \le 315 + 2.447\left(\frac{315}{\sqrt{7}} \right)$$

$$300.202 \le \mu \le 329.798$$

8-30 The data appear to be normally distributed based on examination of the normal probability plot below. Therefore, there is evidence to support that the solar energy is normally distributed.



95% confidence interval on mean solar energy consumed

$$n = 16 \quad \bar{x} = 65.58 \quad s = 4.225 \quad t_{0.025,15} = 2.131$$

$$\bar{x} - t_{0.025,15}\left(\frac{s}{\sqrt{n}}\right) \le \mu \le \bar{x} + t_{0.025,15}\left(\frac{s}{\sqrt{n}}\right)$$

$$65.58 - 2.131\left(\frac{4.225}{\sqrt{16}}\right) \le \mu \le 65.58 + 2.131\left(\frac{4.225}{\sqrt{16}}\right)$$

$$63.329 \le \mu \le 67.831$$