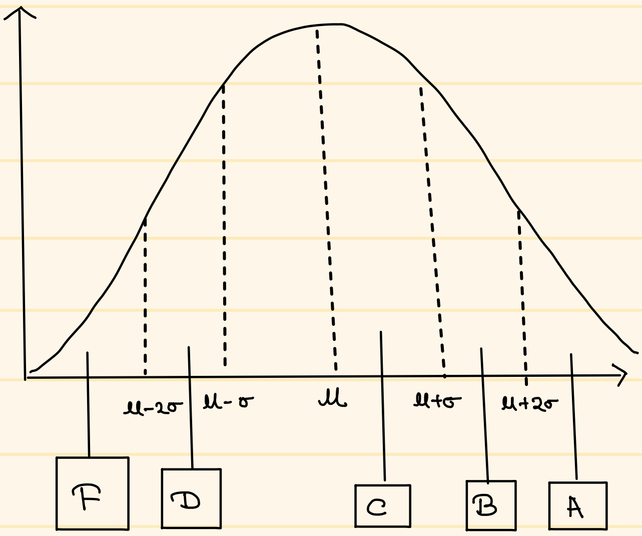
3. Letter grades are associated normal distribution, thus we need



Grade	Interval	Prob	Expected # student
A	$[\mu+2\sigma, \infty)$	0.023	$600\times0.023 = 13.8$
B	$[\mu+\sigma, \mu+2\sigma)$	0.136	$600 \times 0.136 = 81.6$
C	$[\mu-\sigma, \mu+\sigma)$	0.682	$600\times0.682 = 409.2$
D	$[\mu-2\sigma, \mu-\sigma)$	0.136	$600\times0.136 = 81.6$
F	$(-\infty, \mu-2\sigma)$	0.023	$600\times0.023 = 13.8$

total students = 600

$$\chi^2 = \frac{(71-13.8)^2}{13.8} + \frac{(150-81.6)^2}{81.6} + \frac{(210-409.2)^2}{409.2} + \frac{(135-81.6)^2}{81.6} + \frac{(38-13.8)^2}{13.8}$$

$$= 289.43 + 57.33 + 96.97 + 23.08 + 42.43$$

$$= 509.24$$

$$df = \#\text{ of Categories} - 1$$
$$= 5 - 1 = 4$$

$$\chi^2_F \big|_{\alpha=0.05} = 9.488$$
$$\chi^2_F \big|_{\alpha=0.10} = 7.778$$

Since, $\chi^2 > \chi_F^2$ at both 5% and 10% significant levels. Thus we can reject the hypothesis that distribution is normal.

Distribution is <u>not normal</u>.

4) For Shipment A

$$\text{mean} = \mu_A = 4.71$$
$$\text{Variance} = S_A^2 = 0.010283$$

For Shipment B

$$\text{mean} = \mu_B = 4.74$$
$$\text{variance} = S_B^2 = 0.005668$$

$$F = S_A^2 / S_B^2 = 1.815$$

$$\#\text{ of freedom} \;\Big|\; \begin{array}{l} \nu_A = 12 \\ \nu_B = 6 \end{array} \qquad Q(F \mid 12, 6) = 2.9047 \text{ at } \alpha = 0.10$$

$\Rightarrow$ we fail to reject the hypothesis that $S_A^2 = S_B^2$.

$$t = \frac{\mu_A \ \mu_B}{S_D}$$

$$S_D = \sqrt{\frac{S_A^2 N_A + S_B^2 N_B}{N_A + N_B - 2}\left(\frac{1}{N_A} + \frac{1}{N_B}\right)}$$

$$S_D = 0.0438$$

$$t = 0.68493$$

$\Longrightarrow$ We can't reject the hypothesis that $\mu_A = \mu_B$ at 10% Significance level.

Therefore, Ship mod A and B from a distribution whose mean and variance are the same.