3.

Letter Grade	No. of students (observed distribution)
A	77
B	150
C	210
D	125
F	38
	Total = 600

~~Total 600~~

Assuming it to be ~~in~~ a standard normal distribution

Expected distribution

$A \to 7.5\% = 0.075 \times 600 = 45$

$B \to 22.5\% = 0.225 \times 600 = 135$

$C \to 35\% = 0.35 \times 600 = 210$

$D \to 22.5\% = 0.225 \times 600 = 135$

$F \to 7.5\% = 0.075 \times 600 = 45$

Degrees of Freedom $= 5 - 1 = 4$

Critical value (χ^2)

For 5% significance $= 9.488$

For 10% significance $= 7.779$

$$\chi^2 = \sum_i \frac{(O_i - E_i)^2}{E_i}$$

$$= \frac{(77-45)^2}{45} + \frac{(150-135)^2}{135} + \frac{(210-210)^2}{210} + \frac{(125-135)^2}{135} + \frac{(38-45)^2}{135}$$

$$= 26.25$$

$\therefore$ Since, $\chi^2 = 26.25 >$ Critical value at 5% ~~signifiance~~ significance

also $\chi^2 >$ Critical value at 10% significance

$\therefore$ The observed distribution is not a normal distribution ~~in both cas~~ for both significances, 4.

~~Mean $(\bar{A}) = \sum_i \frac{f_i}{N}$~~

$$\text{Mean}(\bar{A}) = \sum_i \frac{f_i}{N} = 4.7146 \text{ cm}$$

$$\text{Mean}(\bar{B}) = \sum_i \frac{f_i}{N} = 4.74 \text{ cm}$$

~~Variance (A) =~~

$$\text{variance} = \frac{1}{N-1} \sum (f_i - \bar{f})^2$$

$$\text{Variance}(A) = 0.01026 \text{ cm}^2$$

$$\text{Variance}(B) = 0.00567 \text{ cm}^2$$

$$\therefore F = \frac{\text{Variance}(A)}{\text{Variance}(B)} = 1.809$$

$$\therefore t = \frac{\bar{A} - \bar{B}}{\sqrt{\frac{\text{Variance}(A)}{n_A} - \frac{\text{Variance}(B)}{n_B}}} = \frac{-0.0254}{\sqrt{0.00079 + 0.00081}} = -0.635$$

$$\therefore |t| = 0.635$$

$\therefore$ F-critical $= 3.999935$, $\left[\because \cancel{\text{dof of}} \text{ Degree of freedom}(A) = 12, \text{ Degree of freedom}(B) = 6\right]$

$\therefore$ t-critical $= 2.1009$ $\left[\because \text{Degree of freedom} = (n_A - 1) + (n_B - 1) = 18\right]$

$\therefore$ Since, the value of F-test and t-test are less than the critical values, the means and variances are not significantly different.

~~$\therefore$ The Both the~~

$\therefore$ Both the shipment of lenses are from same population.