1. Distance between Object 1 and 3

Object	test-1 (nominal)	test-2 (ordinal)	test-3 (numeric)
→ 1	A	excellent	45
2	B	fair	22
→ 3	C	good	64
4	A	excellent	28

test-1 : (0 = same, 1 = different)

$d = 1 \quad \delta = 1$ (include because they disagree)

test-2 : excellent = 3 $\quad \frac{r-1}{max-1} \rightarrow \frac{3-1}{3-1} = \frac{2}{2} = 1$

good = 2 $\quad \frac{r-1}{max-1} \rightarrow \frac{2-1}{3-1} = \frac{1}{2}$

fair = 1 $\quad \frac{r-1}{max-1} \rightarrow \frac{1-1}{3-1} = \frac{0}{2} = 0$

$$d = \frac{x_1 - x_2}{max - min} = \frac{1 - \frac{1}{2}}{1-0} = \frac{1}{2} \qquad \delta = 1$$

test-3 : $d = \frac{x_1 - x_2}{max - min} = \frac{64-45}{64-22} = \frac{19}{42} \qquad \delta = 1$

$$d = \frac{\sum \delta(f) d(f)}{\sum \delta(f)} = \frac{(1)(1) + (1)(\frac{1}{2}) + (1)(\frac{19}{42})}{1+1+1} = 0.6508$$

3. Chi-square test

	Passed	Failed	Total
Attended	25	6	31
Skipped	8	15	23
Total	33	21	54

Passed | Attended Expected : $33\left(\frac{31}{54}\right) = 18.94$

Failed | Attended Expected : $21\left(\frac{31}{54}\right) = 12.06$

Passed | Skipped Expected : $33\left(\frac{23}{54}\right) = 14.06$

Failed | Skipped Expected : $21\left(\frac{23}{54}\right) = 8.94$

$$X^2 = \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}}$$

$$X^2 = \frac{(25-18.94)^2}{18.94} + \frac{(8-14.06)^2}{14.06} + \frac{(6-12.06)^2}{12.06} + \frac{(15-8.94)}{8.94}$$

$$= \frac{36.72}{18.94} + \frac{36.72}{14.06} + \frac{36.72}{12.06} + \frac{36.72}{8.94} = 11.703$$

degree of freedom = 1

From the Chi-square table, $p < 0.001$, therefore there is a correlation or dependency between passing the class and attendence.