

$$\chi = F - E + V$$

$$\chi = 2 - g - r$$

Set these equations equal to each other

$$F - E + V = 2 - g - r$$

$$V = 2 - g - r + E - F$$

$$= 2 - g - r + 3 - 1$$

$$= 4 - g - r < 4 \text{ since surface}$$

non orientable: $g > 0$

$$\chi = 2 - g - r \therefore \chi < 2 \text{ since } g > 0$$

and from ii $\chi \geq -1$ i.e. $-1 \leq \chi \leq 1$

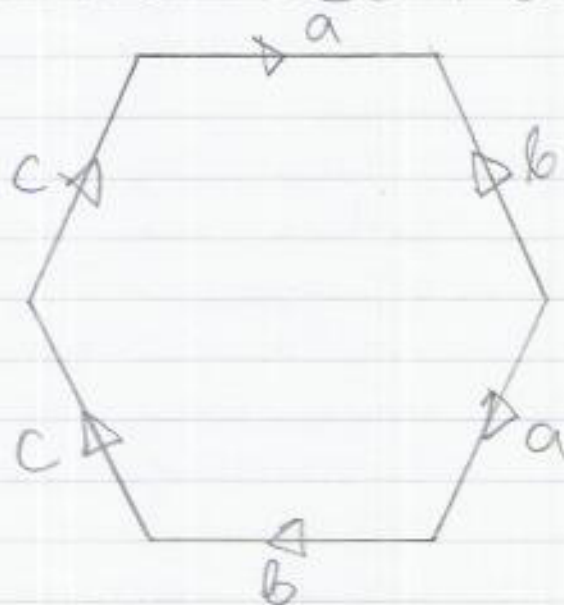
\therefore Possible values for χ are $-1, 0$ and 1 .

3 ✓

iv) $\chi = -1 = 2 - g - r = 2 - g$, since edges identified in pairs implies $r = 0$.

$$\therefore \chi = -1, g = 3$$

The required surface is $aabcbcc = 1$ or $ab^{-1}abcc = 1$ (using Lemma 1)



✓