COMP9020 - Assignment 2

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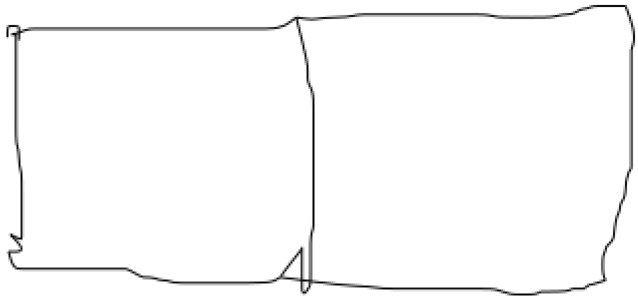
Question 1

(a) For graph G = (E, V) as follows:



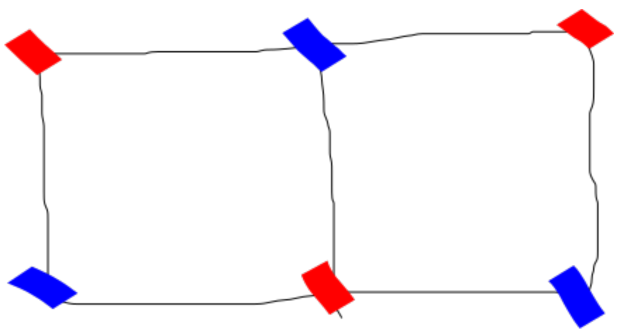
For every $e = (v, w) \in E$

$$c(v) \neq c(w)$$

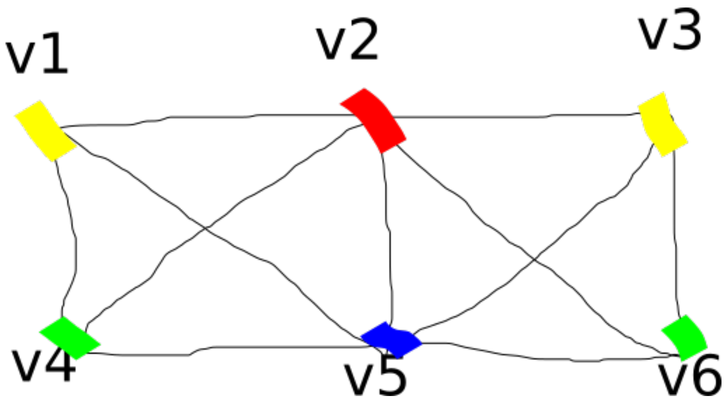
The mininum number of colors to sufficient effect such a mapping, denoted:

$$\chi(G)$$

(b) The minimum number of colors is 2, as follows:



(c) The connection of the graph changes, as follows:



Because v2 connect to v3, so they must be different colours, $c(v2) \neq c(v3)$ v2 and v3 connect to all other vertex, so other vertex must use different colours other than c(v2) and c(v3)

$$c(v1) \neq c(v2) \neq c(v3)$$

also, v1 connect to v4, so $c(v1) \neq c(v4)$, at lease we should use 4 different colors Because I can use 4 different colors as shows in graph, therefore:

$$\chi(G) = 4$$

Question 2

(a)

(b)

(c)

Question 3

(a) (R):

$$x \vee x = x \implies x \sqsubseteq x \, for \, all \, x \in S$$

(AS):

$$x \sqsubseteq y \implies x \vee y = y$$

$$y \sqsubseteq x \implies y \vee x = x$$

$$\because x \vee y = y \vee x$$

$$\therefore x = y$$

(T):

$$x \sqsubseteq y \implies x \vee y = y$$

$$y \sqsubseteq z \implies y \vee z = z$$

$$x \vee z = x \vee (y \vee z) = (x\ lory) \vee z = y \vee z = z$$

$$\therefore x \sqsubseteq z$$

(L): not satisfied

$$for x, y are\, not\, empty,\ if\, x \vee y = \emptyset\, then$$

$$neither\, x \sqsubseteq y\, nor\, y \sqsubseteq x$$

(b) $\sqsubseteq iscorresponseto \subseteq$

$$x \subseteq y \iff x \cup y = y$$

(c) Draw a trueth table:

x	y	$x \vee y$	$(x \vee y) \rightleftarrows y$
T	T	T	T
T	F	T	F
F	T	T	T
F	F	F	T

Therefore, the logic equivilence is:

$$xy + \bar{x}y + \overline{xy} = y + \overline{xy}$$

Question 4

(a)

(b)

(c)

Question 5

(a)

(b)

(c)