Matthew ACS 1/19/2021

Homework #1

Problem 1:

$U = \{a, b, c, d, aa, 1, 2, 5\}$, $A = \{a, b, aa, 5\}$, $B = \{5, c, b, d\}$

i. $A \cup B = \{a, b, aa, 5, c, d\}$

ii. $A \cap B = \{b, 5\}$

iii. $A - B = \{a, aa\}$

iv. $B - A = \{c, d\}$

v. $\overline{A} = \{c, d, 1, 2\}$

vi. $\overline{B} = \{a, aa, 1, 2\}$

vii. $\overline{A \cup B} = \overline{A} \cap \overline{B} = \{1, 2\}$

viii. $\overline{A \cap B} = \overline{A} \cup \overline{B} = \{c, d, 1, 2, a, aa\}$

Problem 2:

$S = \{a, b, ab\}$

$P_S = \{\emptyset, \{a\}, \{b\}, \{ab\}, \{a, b\}, \{a, ab\}, \{a, b, ab\}, \{b, ab\}\}$

Problem 3:

$S = \{a, b, ab\}$

i. 5 partitions: $\{\{a\}, \{b\}, \{ab\}\}$, $\{\{a, b\}, \{ab\}\}$

$\{\{a, ab\}, \{b\}\}$, $\{\{b, ab\}, \{a\}\}$, $\{\{a, b, ab\}\}$

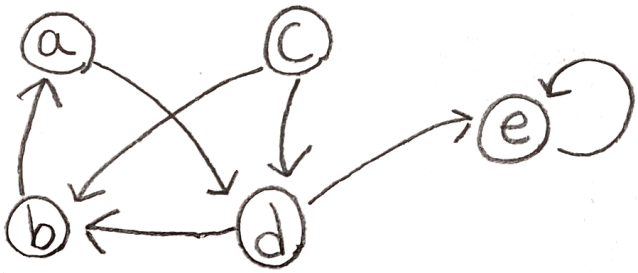
ii. $S \times S = \{(a,a), (a,b), (a,ab), (b,a), (b,b), (b,ab),$

$(ab,a), (ab,b), (ab,ab)\}$

Problem 4:

$V = \{a, b, c, d, e\}$

i.



$E = \{(a,d), (b,a), (c,b),$
$(c,d), (d,b), (d,e), (e,e)\}$

ii. Walk: $(a,d), (d,e), (e,e)$

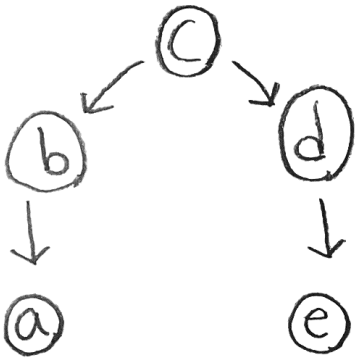
Path: $(c,b), (b,a), (a,d), (d,e)$

Simple path: $(c,d), (d,b), (b,a)$

iii. Yes my graph has a cycle. One cycle is:

$(a,d), (d,b), (b,a)$

Problem 5:



note: I needed to remove some edges from my graph in problem 4 to create this tree because otherwise I could not isolate a subgraph that is a tree.

$V = \{a, b, c, d, e\}$ $E = \{(c,b), (c,d), (b,a), (d,e)\}$