CS 236 MIDTERM 1

2.) $[(aa^*b) \cup b]c^*$ or $[(aa^*) \cup \lambda]bc^*$

or $[(a \cap a^* \cap b) \cup b] \cap c^*$

3.) $P = \{$

$E \rightarrow A \mid E - E$

$A \rightarrow Q \mid A \div A$

$Q \rightarrow p \mid q \mid r$

$\}$

$V = \{E, A, Q, p, q, r, \div, -\}$

4.)

Stack	Input	Action
S#	↑%13#	S → %X
%X#	↑%13#	ADPOP
X#	%↑13#	X → 1Y
1Y#	%↑13#	ADPOP
Y#	%1↑3#	Y → 3
3#	%1↑3#	ADPOP
#	%13↑#	Accept

5.) prove d

1. ¬a
2. a ∨ ¬b ∨ d
3. b ∨ c
4. ¬c

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5. ¬d — negate the conclusion, d
6. ¬b ∨ d — disjunctive syllogism on 1 and 2 ($a \vee \neg b \vee d = a \vee (\neg b \vee d)$)
7. ¬b — disjunctive syllogism on 5 and 6
8. c — disjunctive syllogism on 7 and 3
9. F — resolution on 4 and 8

This is a contradiction, therefore d must be true

∴ d

6.) $\pi_{AB}(R \bowtie T) - S$

$R \bowtie T =$

A	B	C
4	1	4
4	2	4
3	3	6
2	3	6

$\pi_{AB}(R \bowtie T) =$

A	B
4	1
4	2
3	3
2	3

$\pi_{AB}(R \bowtie T) - S =$

A	B
2	3