Week 4

1. Regular languages are closed under intersection.
2. $\Phi \cap$ Any set $= \Phi$
3. $\Phi a^* = \Phi$ & $\Phi \cup \Phi^* = \{\epsilon\}$ hence option b.
4. $(a^* + b)^* = (a + b^*)^*$. $a \in (a^* + b)^*$ but not in option a or d, similar is for ba for option b.
5. III can't be formed using elements of L.
6. As w is any string of length n, minimum number of states required is n+1.
7. $(0+1)^*0(0+1)^*0(0+1)^*$ describes strings containing at least two 0s.
8. $(a + b^*)^* = (a + b)^* \Rightarrow S = T$
9. Except option c none are in L^*.
10. $L_1^* L_2$ denotes i many strings from L_1 followed by a string from $L_2, i \geq 0$. Only 1111101 satisfies that criteria.
11. Only option b satisfies criteria given.
12. Given description fits option d only
13. $1 \in ((101)^* + (00)^*1)^*$ but not accepted by $\epsilon-$NFA.
14. $L = \{0^n 1^n | n \geq 0\}$.
    A) $L \subseteq (0+1)^*$,
    C) $L \cup L^c = (0+1)^*$,
    D)$\cup_{i=0} 0^i 1^i$

    All are counterexamples to given statements.But option b is true as any finite set is regular as $\epsilon-$NFA can be made for finite set.
15. By definition option a is correct