$(A \cup B) \triangle C = \qquad (A \triangle C) \triangle (B \setminus A)$

1. $[(A \cup C) \setminus (A \cap C)] \triangle (B \setminus A)$ — def of symmetric difference
2. $[[(A \cup C) \setminus (A \cap C)] \cup (B \setminus A)] \setminus [[(A \cup C) \setminus (A \cap C)] \cap (B \setminus A)]$ — def of symmetric difference
3. $[[(A \cup C) \cap (A \cup C)] \cup (B \cap A)] \setminus [[(A \cup C) \cap (A \cup C)] \cap (B \cap A)]$ — def of differnce and DeMorgans
4. $[[(A \cup C) \cap (A \cup C)] \cup (B \cap A)] \cap [[(A \cap C) \cup (A \cap C)] \cup (B \cup A)]$ — def of differnce and DeMorgans

inorder to reduce number of steps I will use substitution
$R = (A \cup C),\ S = (A \cup C),\ T = (B \cap A)$

5. $[(R \cap S) \cup T] \cap [(R \cup S) \cup T]$ — substitution
6. $[[(R \cap S) \cup T] \cap (R \cup S)] \cup [(R \cap S) \cup T] \cap T]$ — distributive law
7. $[[(R \cap S) \cap (R \cup S)] \cup [T \cap (R \cup S)]] \cup [[(R \cap S) \cap T] \cup [T \cap T]]$ — distributive law
8. $[[\emptyset] \cup [T \cap (R \cup S)]] \cup [[(R \cap S) \cap T] \cup [\emptyset]]$ — complement law
9. $[T \cap (R \cup S)] \cup [(R \cap S) \cap T]$ — identity law
10. $[(T \cap R) \cup (T \cap S)] \cup [R \cap S \cap T]$ — distributive law
11. $[((B \cap A) \cap (A \cap C)) \cup ((B \cap A) \cap (A \cap C))] \cup [(A \cup C) \cap (A \cup C) \cap (B \cup A)]$ — substitution
12. $[(B \cap A \cap C) \cup ((B \cap A) \cap (A \cap C))] \cup [(A \cup C) \cap (A \cup C) \cap (B \cup A)]$ — idempotent
13. $[(B \cap A \cap C) \cup ((B \cap \emptyset \cap C))] \cup [(A \cup C) \cap (A \cup C) \cap (B \cup A)]$ — complement
14. $[(B \cap A \cap C) \cup \emptyset] \cup [(A \cup C) \cap (A \cup C) \cap (B \cup A)]$ — domination
15. $[(B \cap A \cap C)] \cup [(A \cup C) \cap (A \cup C) \cap (B \cup A)]$ — identity
16. $[(B \cap A \cap C)] \cup [((A \cap (A \cup C)) \cup (C \cap (A \cup C))) \cap (B \cup A)]$ — distributive
17. $[(B \cap A \cap C)] \cup [((A \cap A) \cup (A \cap C)) \cup ((C \cap A) \cup (C \cap C))) \cap (B \cup A)]$ — distributive
18. $[(B \cap A \cap C)] \cup [(\emptyset \cup (A \cap C)) \cup ((C \cap A) \cup \emptyset)) \cap (B \cup A)]$ — complement
19. $[(B \cap A \cap C)] \cup [((A \cap C)) \cup ((C \cap A))) \cap (B \cup A)]$ — domination