

PC Entailments

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| <p>1)</p> $\begin{array}{l} 1. (P \rightarrow Q) \\ 2. P \\ \hline \therefore 3. Q \end{array}$ | <p>9)</p> $\begin{array}{l} 1. (P \rightarrow (Q \rightarrow (R \rightarrow S))) \\ \hline \therefore 2. (R \rightarrow (P \rightarrow (Q \rightarrow S))) \end{array}$ |
| <p>2)</p> $\begin{array}{l} 1. (P \rightarrow Q) \\ \hline \therefore 2. \sim(P \wedge \sim Q) \end{array}$ | <p>10)</p> $\begin{array}{l} 1. ((P \rightarrow R) \wedge (Q \rightarrow R)) \\ \hline \therefore 2. ((P \vee Q) \rightarrow R) \end{array}$ |
| <p>3)</p> $\begin{array}{l} 1. (P \leftrightarrow Q) \\ \hline \therefore 2. ((P \wedge Q) \vee (\sim P \wedge \sim Q)) \end{array}$ | <p>11)</p> $\begin{array}{l} 1. (P \rightarrow Q) \\ 2. (R \rightarrow S) \\ \hline \therefore 3. ((P \vee R) \rightarrow (Q \vee S)) \end{array}$ |
| <p>4)</p> $\begin{array}{l} 1. (P \rightarrow Q) \\ 2. (Q \rightarrow R) \\ \hline \therefore 3. (P \rightarrow R) \end{array}$ | <p>12)</p> $\begin{array}{l} 1. (P \rightarrow Q) \\ 2. (R \rightarrow S) \\ \hline \therefore 3. (P \wedge R) \rightarrow (Q \wedge S) \end{array}$ |
| <p>5)</p> $\begin{array}{l} 1. (P \rightarrow (Q \vee R)) \\ 2. \sim Q \\ \hline \therefore 3. (P \rightarrow R) \end{array}$ | <p>13)</p> $\begin{array}{l} 1. (P \leftrightarrow Q) \\ \hline \therefore 2. (\sim P \leftrightarrow \sim Q) \end{array}$ |
| <p>6)</p> $\begin{array}{l} 1. \sim(P \wedge \sim Q) \wedge \sim(Q \wedge \sim P) \\ \hline \therefore 2. (P \leftrightarrow Q) \end{array}$ | <p>14)</p> $\begin{array}{l} 1. (P \vee Q) \leftrightarrow P \\ \hline \therefore 2. (Q \rightarrow P) \end{array}$ |
| <p>7)</p> $\begin{array}{l} 1. (P \rightarrow \sim R) \\ 2. (Q \rightarrow \sim(P \vee R)) \\ \hline \therefore 3. ((P \vee Q) \rightarrow \sim R) \end{array}$ | <p>15)</p> $\begin{array}{l} 1. (P \leftrightarrow \sim Q) \\ 2. (Q \leftrightarrow \sim R) \\ \hline \therefore 3. (P \leftrightarrow R) \end{array}$ |
| <p>8)</p> $\begin{array}{l} 1. \sim(P \wedge Q) \\ 2. (R \rightarrow P) \\ 3. (R \rightarrow Q) \\ \hline \therefore 4. \sim R \end{array}$ | <p>16)</p> $\begin{array}{l} 1. (\sim P \rightarrow Q) \\ \hline \therefore 2. (P \vee Q) \end{array}$ |

17)

1. P
 2. Q

 \therefore 3. $\sim(P \rightarrow \sim Q)$

18)

1. $(P \vee Q)$

 \therefore 2. $(\sim P \rightarrow Q)$

19)

1. $(P \rightarrow (Q \vee R))$
 2. $\sim Q$

 \therefore 3. $(P \rightarrow R)$

20)

1. $(P \rightarrow \sim R)$
 2. $(Q \rightarrow \sim(P \vee R))$

 \therefore 3. $((P \vee Q) \rightarrow \sim R)$

PC Theorems

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| 21. | $(P \wedge (P \rightarrow Q)) \rightarrow Q$ | 34. | $(P \vee Q) \leftrightarrow \sim(\sim P \wedge \sim Q)$ |
| 22. | $(\sim Q \wedge (P \rightarrow Q)) \rightarrow \sim P$ | 35. | $(P \vee Q) \leftrightarrow (Q \vee P)$ |
| 23. | $(P \wedge \sim(P \wedge Q)) \rightarrow \sim Q$ | 36. | $(P \wedge Q) \leftrightarrow (Q \wedge P)$ |
| 24. | $(\sim P \wedge (P \vee Q)) \rightarrow Q$ | 37. | $((P \vee Q) \vee R) \leftrightarrow (P \vee (Q \vee R))$ |
| 25. | $(P \wedge Q) \rightarrow P$ | 38. | $((P \wedge Q) \wedge R) \leftrightarrow (P \wedge (Q \wedge R))$ |
| 26. | $((P \rightarrow Q) \wedge (Q \rightarrow R)) \rightarrow (P \rightarrow R)$ | 39. | $(P \rightarrow Q) \leftrightarrow (\sim Q \rightarrow \sim P)$ |
| 27. | $P \rightarrow (P \vee Q)$ | 40. | $(P \wedge (Q \vee R)) \leftrightarrow ((P \wedge Q) \vee (P \wedge R))$ |
| 28. | $(P \rightarrow (Q \wedge \sim Q)) \rightarrow \sim P$ | 41. | $(P \vee (Q \wedge R)) \leftrightarrow ((P \vee Q) \wedge (P \vee R))$ |
| 29. | $P \leftrightarrow P$ | 42. | $(P \rightarrow (Q \rightarrow R)) \leftrightarrow (Q \rightarrow (P \rightarrow R))$ |
| 30. | $P \leftrightarrow \sim\sim P$ | 43. | $((P \wedge Q) \rightarrow R) \leftrightarrow ((P \rightarrow (Q \rightarrow R))$ |
| 31. | $P \vee \sim P$ | 44. | $(P \rightarrow Q) \leftrightarrow (\sim P \vee Q)$ |
| 32. | $\sim(P \wedge \sim P)$ | 45. | $\sim(P \rightarrow Q) \leftrightarrow (P \wedge \sim Q)$ |
| 33. | $(P \wedge Q) \leftrightarrow \sim(\sim P \vee \sim Q)$ | | |