

PC Entailments

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

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. | $(P \wedge Q) \leftrightarrow \sim(\sim P \vee \sim Q)$ | | |