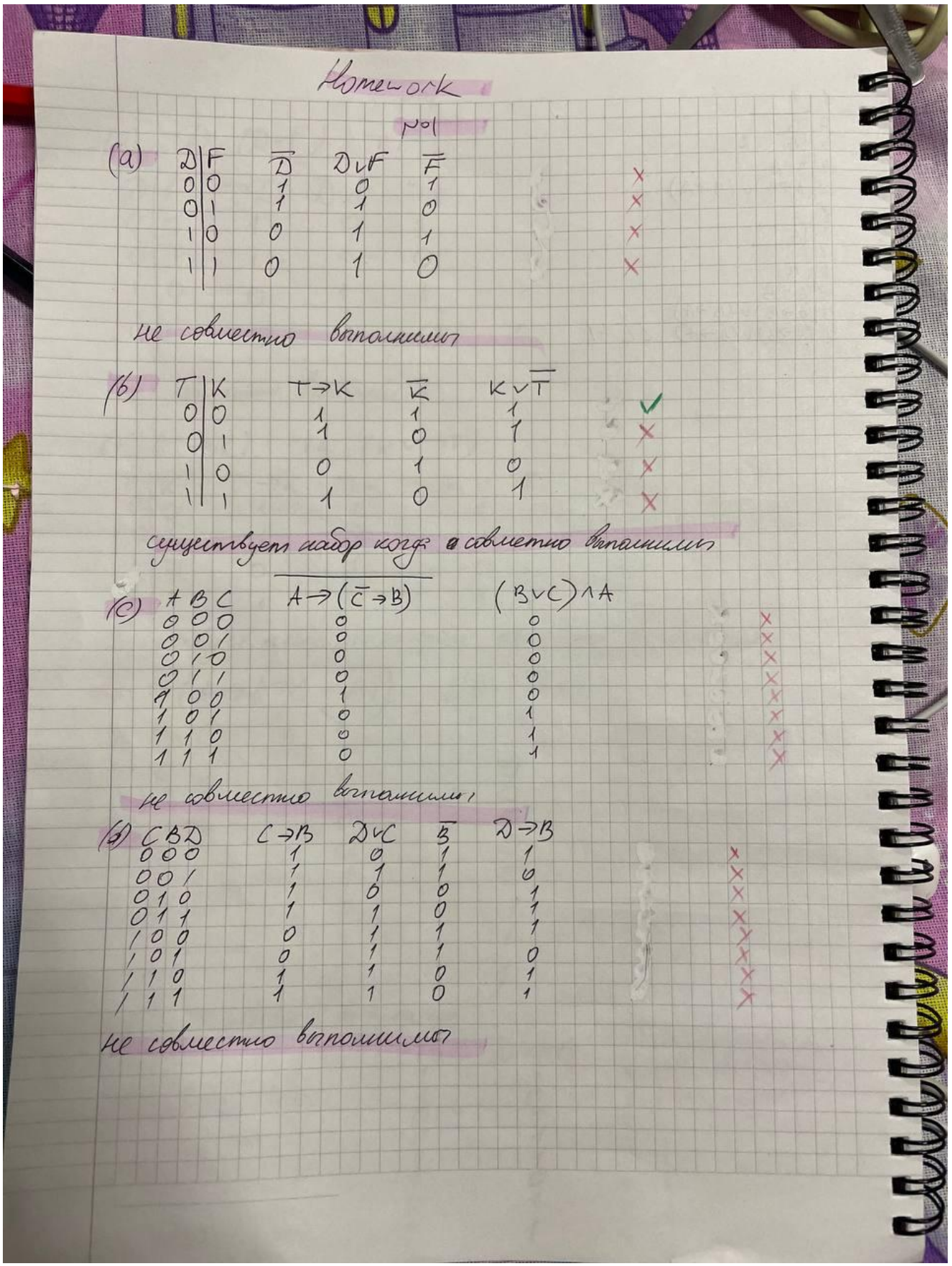



Скрины проверки корректности пруфов в конце

P.2

(a)

| | | |
|---|---|---|
| 1 | $H \to (R \wedge C)$ | Premise |
| 2 | $\overline{R} \vee \overline{C}$ | Premise |
| 3 | $\overline{R \wedge C}$ | DeM 3 |
| ∴ | $\overline{H}$ | MT 1,3 |

(b)

| | | |
|---|---|---|
| 1 | $K \wedge S$ | Premise |
| 2 | $\overline{K}$ | Premise |
| 3 | $K$ | ∧E 1 |
| 4 | $\bot$ | ¬E 2,3 |
| ∴ | $\overline{S}$ | X 4 |

(c)

| | | |
|---|---|---|
| 1 | $A \to \overline{A}$ | Premise |
| 2 | \| $A$ | |
| 3 | \| $\overline{A}$ | MP 1,2 |
| 4 | \| $\overline{A}$ | |
| 5 | \| $\overline{A}$ | R 4 |
| ∴ | $\overline{A}$ | LEM 2-3, 4-5 |

(d)

| | | |
|---|---|---|
| 1 | $(P \wedge Q) \vee (P \wedge R)$ | Premise |
| 2 | \| $P \wedge Q$ | |
| 3 | \| $P$ | ∧E 2 |
| 4 | \| $P \wedge R$ | |
| 5 | \| $P$ | ∧E 4 |
| ∴ | $P$ | ∨E 1, 2-3, 4-5 |

P.3

(a) philosophers ponder profound problems (A)
their quandaries quell quotidian quibbles (B)
reasoning reveals reality (C)

| A | B | C | $A \to B$ | , | $\overline{B} \vee C$ | , | $\overline{A}$ | ∴ | C |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | | 1 | | 0 | . | 0 |
| 0 | 0 | 1 | 1 | | 1 | | 0 | . | 1 |
| 0 | 1 | 0 | 1 | | 0 | | 0 | . | 0 |
| 0 | 1 | 1 | 1 | | 1 | | 0 | . | 1 |
| 1 | 0 | 0 | 0 | | 1 | | 1 | . | 0 |
| 1 | 0 | 1 | 0 | | 1 | | 1 | . | 1 |
| 1 | 1 | 0 | 1 | | 0 | | 1 | . | 0 |
| 1 | 1 | 1 | 1 | | 1 | | 1 | . | 1 |

∴ valid

| | | |
|---|---|---|
| 1 | $A \to B$ | Premise |
| 2 | $\bar{B} \vee C$ | Premise |
| 3 | $A$ | Premise |
| 4 | $B$ | MP 1,2 |
| 5 | $\bar{C}$ | |
| 6 | $\bar{B}$ | DS 2,5 |
| 7 | $\perp$ | ¬E 4,6 |
| ∴ | $C$ | IP 5-7 |

(b) aardvarks are adorable (A)
baboons beat bongos (B)
crocodiles can't consume cute capybaras (C)

| A | B | C | $A \to (B \vee C)$ | B | $\bar{A} \vee C$ | ∴ | $\bar{A}$ |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 0 | 1 | • | 1 |
| 0 | 0 | 1 | 1 | 0 | 1 | • | 1 |
| 0 | 1 | 0 | 1 | 1 | 1 | ✓ | 1 |
| 0 | 1 | 1 | 1 | 1 | 1 | ✓ | 1 |
| 1 | 0 | 0 | 0 | 0 | 0 | • | 0 |
| 1 | 0 | 1 | 1 | 0 | 1 | • | 0 |
| 1 | 1 | 0 | 1 | 1 | 0 | • | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | X | 0 |

no valid ($A=1, B=1, C=1$)

(c) discipline defeat deficiency (A)
geniuses generally get good grades (B)
homework has harmed humanity (C)

| A | B | C | $\bar{A} \to B$ | $A \to C$ | ∴ | $B \vee C$ |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 | • | 0 |
| 0 | 0 | 1 | 0 | 1 | • | 1 |
| 0 | 1 | 0 | 1 | 1 | ✓ | 1 |
| 0 | 1 | 1 | 1 | 1 | ✓ | 1 |
| 1 | 0 | 0 | 1 | 0 | • | 0 |
| 1 | 0 | 1 | 1 | 1 | ✓ | 1 |
| 1 | 1 | 0 | 1 | 0 | • | 1 |
| 1 | 1 | 1 | 1 | 1 | ✓ | 1 |

valid

| | | |
|---|---|---|
| 1 | $A \to C$ | Premise |
| 2 | $\bar{A} \to B$ | Premise |
| 3 | A | |
| 4 | C | MP 1,3 |
| 5 | $B \vee C$ | $\vee$I 4 |
| 6 | $\bar{A}$ | |
| 7 | B | MP 2,6 |
| 8 | $B \vee C$ | $\vee$I 7 |
| $\therefore$ | $B \vee C$ | LEM 3-5, 6-8 |

(d) Так, как камета

crocodiles can consume cute capybaras != crocodiles consume cute capybaras

и решила задачу для двух случаев

1 вариант решения (crocodiles can consume... = crocodiles consume...)

Crocodiles can consume cute capybaras (A)

incarcerating iguanas is't illegal (B)

Mad monkeys make mayhem (C)

dinosaurs do disco dance (D)

| A | B | C | D | $A \to B$ | $(C \cdot D) \vee A$ | $\bar{B}$ | $\therefore$ | $D \equiv C$ |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | . | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | . | 0 |
| 0 | 0 | 1 | 0 | 1 | 0 | 1 | . | 0 |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | ✓ | 1 |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | . | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 | 0 | . | 0 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | . | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 0 | . | 1 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | . | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | . | 0 |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | . | 0 |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 | . | 1 |
| 1 | 1 | 0 | 0 | 1 | 1 | 0 | . | 1 |
| 1 | 1 | 0 | 1 | 1 | 1 | 0 | . | 0 |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | . | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | . | 1 |

valid

| | | |
|---|---|---|
| 1 | $A \to B$ | Premise |
| 2 | $(C \wedge D) \vee A$ | Premise |
| 3 | $\overline{B}$ | Premise |
| 4 | $\overline{A}$ | MT 1,3 |
| 5 | $C \wedge D$ | DS 2,4 |
| 6 | $C$ | $\wedge E$ 5 |
| 7 | $D$ | $\wedge E$ 5 |
| 8 | \| $C$ | |
| 9 | \| $D$ | R 7 |
| 10 | \| $D$ | |
| 11 | \| $C$ | R 6 |
| ∴ | $D \equiv C$ | $\leftrightarrow I$ 8-9, 10-11 |

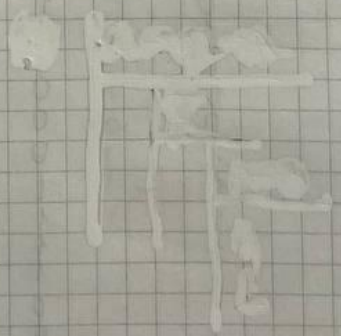
2 случаи:

Crocodiles consume cute capybars (A)
incarcerating iguanas isn't illegal (B)
Mad monkeys make mayhem (C)
dinosaurs do disco dance (D)
Crocodiles can consume cute capybaras (Q)

| A | B | C | D | Q | $Q \to B$ | $(C \wedge D) \vee A$ | $\overline{B}$ | ∴ | $D \equiv C$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | × | 0 |

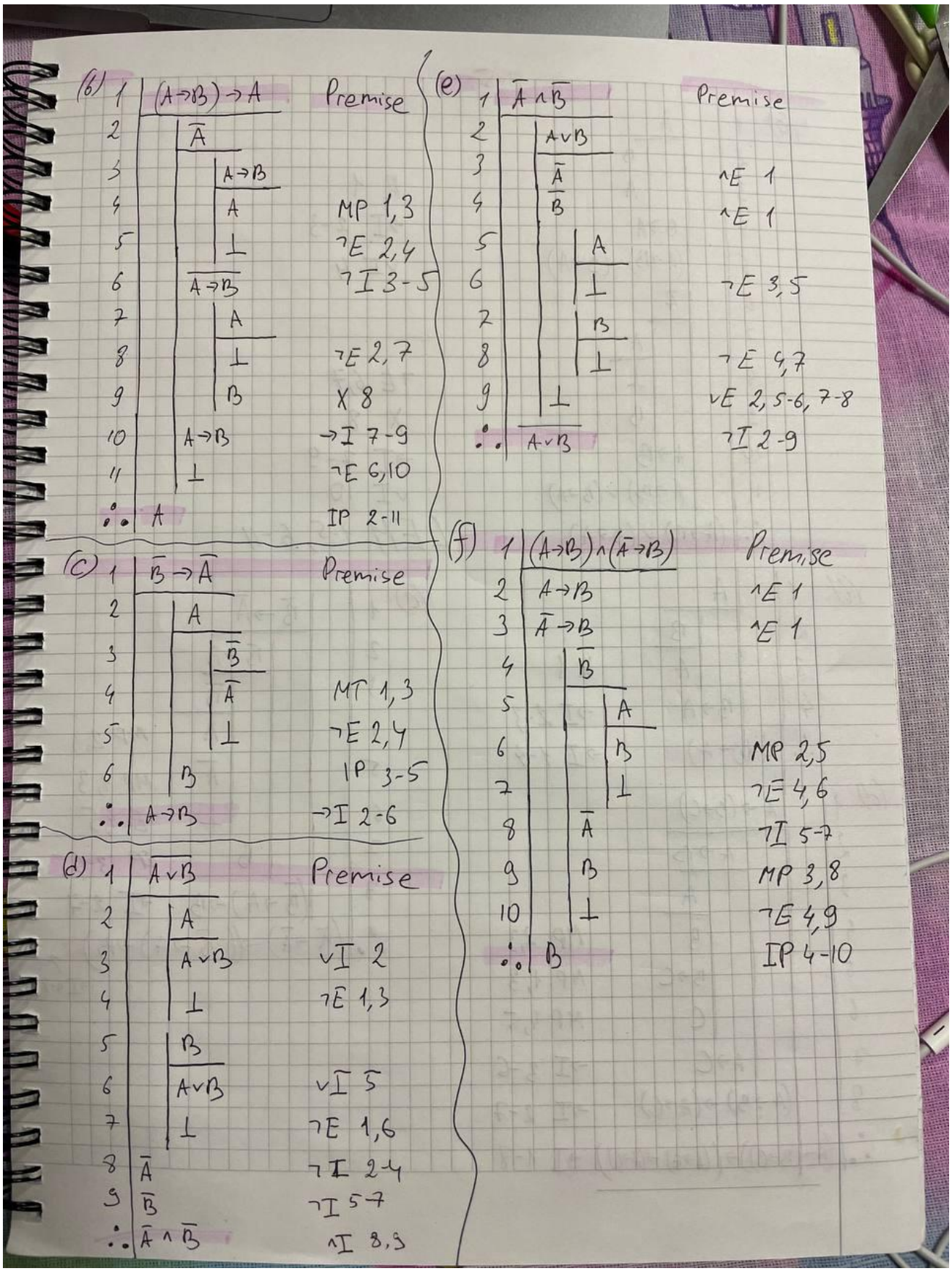
no valid ($A=1, B=0, C=1, D=0, Q=0$)

pog



(a)

| | | |
|---|---|---|
| 1 | $\overline{\overline{A}}$ | Premise |
| 2 | \| $\overline{A}$ | |
| 3 | \| $\bot$ | $\neg E$ 1,2 |
| ∴ | $A$ | IP 2-3 |


(b)
1 (A→B)→A Premise
2 Ā
3 A→B
4 A MP 1,3
5 ⊥ ¬E 2,4
6 A→B ¬I 3-5
7 A
8 ⊥ ¬E 2,7
9 B X 8
10 A→B →I 7-9
11 ⊥ ¬E 6,10
∴ A IP 2-11
(c)
1 B̄→Ā Premise
2 A
3 B̄
4 Ā MT 1,3
5 ⊥ ¬E 2,4
6 B IP 3-5
∴ A→B →I 2-6
(d)
1 Ā∨B Premise
2 A
3 A∨B ∨I 2
4 ⊥ ¬E 1,3
5 B
6 A∨B ∨I 5
7 ⊥ ¬E 1,6
8 Ā ¬I 2-4
9 B̄ ¬I 5-7
∴ Ā∧B ∧I 8,9
(e)
1 Ā∧B̄ Premise
2 A∨B
3 Ā ∧E 1
4 B̄ ∧E 1
5 A
6 ⊥ ¬E 3,5
7 B
8 ⊥ ¬E 4,7
9 ⊥ ∨E 2,5-6,7-8
∴ A∨B ¬I 2-9
(f)
1 (A→B)∧(Ā→B) Premise
2 A→B ∧E 1
3 Ā→B ∧E 1
4 B̄
5 A
6 B MP 2,5
7 ⊥ ¬E 4,6
8 Ā ¬I 5-7
9 B MP 3,8
10 ⊥ ¬E 4,9
∴ B IP 4-10

(a)

| | | |
|---|---|---|
| 1 | A | |
| 2 | B | |
| 3 | A | R 1 |
| 4 | B→A | →I 2-3 |
| 5 | (A→B)∨(B→A) | ∨I 4 |
| 6 | ¬A | |
| 7 | A | |
| 8 | ⊥ | ¬E 6,7 |
| 9 | B | X 8 |
| 10 | A→B | →I 7-9 |
| 11 | (A→B)∨(B→A) | ∨I 10 |
| ∴ | (A→B)∨(B→A) | LEM 1-5, 6-11 |

(b)

| | | |
|---|---|---|
| 1 | A | |
| 2 | B | |
| 3 | A | R 1 |
| 4 | B→A | →I 2-3 |
| ∴ | A→(B→A) | →I 1-4 |

(c)

| | | |
|---|---|---|
| 1 | ¬B→¬A | |
| 2 | ¬B→A | |
| 3 | ¬B | |
| 4 | A | MP 2,3 |
| 5 | ¬A | MP 1,3 |
| 6 | ⊥ | ¬E 4,5 |
| 7 | B | IP 3-6 |
| 8 | (¬B→A)→B | →I 2-7 |
| ∴ | (¬B→¬A)→((¬B→A)→B) | →I 1-8 |

(d)

| | | |
|---|---|---|
| 1 | A→(B→C) | |
| 2 | A→B | |
| 3 | A | |
| 4 | B | MP 2,3 |
| 5 | B→C | MP 1,3 |
| 6 | C | MP 4,5 |
| 7 | A→C | →I 3-6 |
| 8 | (A→B)→(A→C) | →I 2-7 |
| ∴ | (A→(B→C))→((A→B)→(A→C)) | →I 1-8 |

**2 номер**

# Proof:

Construct a proof for the argument: $H \rightarrow (R \wedge C), \neg R \vee \neg C \therefore \neg H$

| | | |
|---|---|---|
| 1 | $H \rightarrow (R \wedge C)$ | |
| 2 | $\neg R \vee \neg C$ | |
| 3 | $\neg(R \wedge C)$ | DeM 2 |
| 4 | $\neg H$ | MT 1, 3 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

CHECK PROOF START OVER

# Proof:

Construct a proof for the argument: $K \wedge S, \neg K \therefore \neg S$

| | | |
|---|---|---|
| 1 | $K \wedge S$ | |
| 2 | $\neg K$ | |
| 3 | $K$ | $\wedge$E 1 |
| 4 | $\perp$ | ¬E 2, 3 |
| 5 | $\neg S$ | X 4 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

CHECK PROOF START OVER

# Proof:

Construct a proof for the argument: $A \rightarrow \neg A \therefore \neg A$

| | | |
|---|---|---|
| 1 | $A \rightarrow \neg A$ | |
| 2 | $\quad A$ | |
| 3 | $\quad \neg A$ | →E 1, 2 |
| 4 | $\quad \neg A$ | |
| 5 | $\quad \neg A$ | R 4 |
| 6 | $\neg A$ | LEM 2–3, 4–5 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

CHECK PROOF START OVER

# Proof:

Construct a proof for the argument: $(P \wedge Q) \vee (P \wedge R) \therefore P$

| | | |
|---|---|---|
| 1 | $(P \wedge Q) \vee (P \wedge R)$ | |
| 2 | $\quad (P \wedge Q)$ | |
| 3 | $\quad P$ | ∧E 2 |
| 4 | $\quad (P \wedge R)$ | |
| 5 | $\quad P$ | ∧E 4 |
| 6 | $P$ | ∨E 1, 2–3, 4–5 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

CHECK PROOF START OVER

**3 номер**

# Proof:

Construct a proof for the argument: $A \to B, \neg B \vee C, A \therefore C$

| | | |
|---|---|---|
| 1 | $A \to B$ | |
| 2 | $\neg B \vee C$ | |
| 3 | $A$ | |
| 4 | $B$ | →E 1, 3 |
| 5 | $\neg C$ | |
| 6 | $\neg B$ | DS 2, 5 |
| 7 | $\bot$ | ¬E 4, 6 |
| 8 | $C$ | IP 5–7 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

# Proof:

Construct a proof for the argument: $A \to C, \neg A \to B \therefore B \vee C$

| | | |
|---|---|---|
| 1 | $A \to C$ | |
| 2 | $\neg A \to B$ | |
| 3 | $A$ | |
| 4 | $C$ | →E 1, 3 |
| 5 | $B \vee C$ | ∨I 4 |
| 6 | $\neg A$ | |
| 7 | $B$ | →E 2, 6 |
| 8 | $B \vee C$ | ∨I 7 |
| 9 | $B \vee C$ | LEM 3–5, 6–8 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

# Proof:

Construct a proof for the argument: $A \rightarrow B, (C \wedge D) \vee A, \neg B \therefore D \leftrightarrow C$

| | | |
|---|---|---|
| 1 | $A \rightarrow B$ | |
| 2 | $(C \wedge D) \vee A$ | |
| 3 | $\neg B$ | |
| 4 | $\neg A$ | MT 1, 3 |
| 5 | $C \wedge D$ | DS 2, 4 |
| 6 | $C$ | $\wedge$E 5 |
| 7 | $D$ | $\wedge$E 5 |
| 8 | $D$ | |
| 9 | $C$ | R 6 |
| 10 | $C$ | |
| 11 | $D$ | R 7 |
| 12 | $D \leftrightarrow C$ | $\leftrightarrow$I 8–9, 10–11 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

**4 номер**

# Proof:

Construct a proof for the argument: $\neg\neg A \therefore A$

| | | |
|---|---|---|
| 1 | $\neg\neg A$ | |
| 2 | $\neg A$ | |
| 3 | $\perp$ | ¬E 1, 2 |
| 4 | $A$ | IP 2–3 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

CHECK PROOF START OVER

# Proof:

Construct a proof for the argument: $(A \rightarrow B) \rightarrow A \therefore A$

| | | |
|---|---|---|
| 1 | $(A \rightarrow B) \rightarrow A$ | |
| 2 | $\neg A$ | |
| 3 | $A \rightarrow B$ | |
| 4 | $A$ | →E 1, 3 |
| 5 | $\bot$ | ¬E 2, 4 |
| 6 | $\neg(A \rightarrow B)$ | ¬I 3–5 |
| 7 | $A$ | |
| 8 | $\bot$ | ¬E 2, 7 |
| 9 | $B$ | X 8 |
| 10 | $A \rightarrow B$ | →I 7–9 |
| 11 | $\bot$ | ¬E 6, 10 |
| 12 | $A$ | IP 2–11 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

# Proof:

Construct a proof for the argument: $\neg B \rightarrow \neg A \therefore A \rightarrow B$

| | | |
|---|---|---|
| 1 | $\neg B \rightarrow \neg A$ | |
| 2 | $A$ | |
| 3 | $\neg B$ | |
| 4 | $\neg A$ | →E 1, 3 |
| 5 | $\bot$ | ¬E 2, 4 |
| 6 | $B$ | IP 3–5 |
| 7 | $A \rightarrow B$ | →I 2–6 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

# Proof:

Construct a proof for the argument: $\neg(A \vee B) \therefore \neg A \wedge \neg B$

| | | |
|---|---|---|
| 1 | $\neg(A \vee B)$ | |
| 2 | $\quad A$ | |
| 3 | $\quad A \vee B$ | $\vee$I 2 |
| 4 | $\quad \bot$ | $\neg$E 1, 3 |
| 5 | $\quad B$ | |
| 6 | $\quad A \vee B$ | $\vee$I 5 |
| 7 | $\quad \bot$ | $\neg$E 1, 6 |
| 8 | $\neg A$ | $\neg$I 2–4 |
| 9 | $\neg B$ | $\neg$I 5–7 |
| 10 | $\neg A \wedge \neg B$ | $\wedge$I 8, 9 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

# Proof:

Construct a proof for the argument: $\neg A \land \neg B \therefore \neg(A \lor B)$

| | | |
|---|---|---|
| 1 | $\neg A \land \neg B$ | |
| 2 | $\quad A \lor B$ | |
| 3 | $\quad \neg A$ | $\land$E 1 |
| 4 | $\quad \neg B$ | $\land$E 1 |
| 5 | $\quad\quad A$ | |
| 6 | $\quad\quad \bot$ | ¬E 3, 5 |
| 7 | $\quad\quad B$ | |
| 8 | $\quad\quad \bot$ | ¬E 4, 7 |
| 9 | $\quad \bot$ | $\lor$E 2, 5–6, 7–8 |
| 10 | $\neg(A \lor B)$ | ¬I 2–9 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

# Proof:

Construct a proof for the argument: $(A \to B) \land (\neg A \to B) \therefore B$

| | | |
|---|---|---|
| 1 | $(A \to B) \land (\neg A \to B)$ | |
| 2 | $A \to B$ | $\land$E 1 |
| 3 | $\neg A \to B$ | $\land$E 1 |
| 4 | $\quad \neg B$ | |
| 5 | $\quad\quad A$ | |
| 6 | $\quad\quad B$ | →E 2, 5 |
| 7 | $\quad\quad \bot$ | ¬E 4, 6 |
| 8 | $\quad \neg A$ | ¬I 5–7 |
| 9 | $\quad B$ | →E 3, 8 |
| 10 | $\quad \bot$ | ¬E 4, 9 |
| 11 | $B$ | IP 4–10 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

**5 номер**

# Proof:

Construct a proof for the argument: $\therefore (A \rightarrow B) \vee (B \rightarrow A)$

| | | |
|---|---|---|
| 1 | $A$ | |
| 2 | $\quad B$ | |
| 3 | $\quad A$ | R 1 |
| 4 | $B \rightarrow A$ | →I 2–3 |
| 5 | $(A \rightarrow B) \vee (B \rightarrow A)$ | ∨I 4 |
| 6 | $\neg A$ | |
| 7 | $\quad A$ | |
| 8 | $\quad \bot$ | ¬E 6, 7 |
| 9 | $\quad B$ | X 8 |
| 10 | $(A \rightarrow B)$ | →I 7–9 |
| 11 | $(A \rightarrow B) \vee (B \rightarrow A)$ | ∨I 10 |
| 12 | $(A \rightarrow B) \vee (B \rightarrow A)$ | LEM 1–5, 6–11 |

NEW LINE NEW SUBPROOF

☺ Congratulations! This proof is correct.

# Proof:

Construct a proof for the argument: $\therefore A \rightarrow (B \rightarrow A)$

| | | |
|---|---|---|
| 1 | $A$ | |
| 2 | $B$ | |
| 3 | $A$ | R 1 |
| 4 | $B \rightarrow A$ | →I 2–3 |
| 5 | $A \rightarrow (B \rightarrow A)$ | →I 1–4 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

# Proof:

Construct a proof for the argument: $\therefore (\neg B \rightarrow \neg A) \rightarrow [(\neg B \rightarrow A) \rightarrow B]$

| | | |
|---|---|---|
| 1 | $\neg B \rightarrow \neg A$ | |
| 2 | $\neg B \rightarrow A$ | |
| 3 | $\neg B$ | |
| 4 | $A$ | →E 2, 3 |
| 5 | $\neg A$ | →E 1, 3 |
| 6 | $\bot$ | ¬E 4, 5 |
| 7 | $B$ | IP 3–6 |
| 8 | $(\neg B \rightarrow A) \rightarrow B$ | →I 2–7 |
| 9 | $(\neg B \rightarrow \neg A) \rightarrow ((\neg B \rightarrow A) \rightarrow B)$ | →I 1–8 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

CHECK PROOF START OVER

# Proof:

Construct a proof for the argument: $\therefore [A \rightarrow (B \rightarrow C)] \rightarrow [(A \rightarrow B) \rightarrow (A \rightarrow C)]$

| | | |
|---|---|---|
| 1 | $A \rightarrow (B \rightarrow C)$ | |
| 2 | $A \rightarrow B$ | |
| 3 | $A$ | |
| 4 | $B$ | →E 2, 3 |
| 5 | $B \rightarrow C$ | →E 1, 3 |
| 6 | $C$ | →E 4, 5 |
| 7 | $A \rightarrow C$ | →I 3–6 |
| 8 | $(A \rightarrow B) \rightarrow (A \rightarrow C)$ | →I 2–7 |
| 9 | $(A \rightarrow (B \rightarrow C)) \rightarrow ((A \rightarrow B) \rightarrow (A \rightarrow C))$ | →I 1–8 |

NEW LINE NEW SUBPROOF

Congratulations! This proof is correct.

CHECK PROOF START OVER