

Answers Midterm

1. a. Translation key W: Mitch works with the FBI.
 L: Mitch leaves the firm.
 K: Mitch will lose his life as he knows it.
Translation: $(W \vee L) \rightarrow K$

b. Translation key U: Kimble uncovers the identity
 of the one-armed man.
 A: Kimble is acquitted of first-degree murder.
Translation: $A \rightarrow U$

c. Translation key D: Neven decipheres the labyrinthine
 puzzle in time.
 L: The Priory's secret will be lost forever.
Translation: $D \leftrightarrow \neg L$

Answers Midterm

2 a. Translation key
r: Ralph
v: Vanellope
H(x,y): x helps y
M(x): x gets a medal
Translation: $(H(r,v) \rightarrow H(v,r)) \vee M(r)$
also $H(r,v) \rightarrow (H(v,r) \vee M(r))$

b. Translation key
v: Vanellope
r: Ralph
C(x): x is chosen
S(x,y): x stops y
D(x): x will die
U(x): x updates the game
Translation: $(C(v) \wedge S(r,v)) \rightarrow (D(v) \vee \neg U(r))$
also $((C(v) \wedge S(r,v)) \rightarrow D(v)) \vee \neg U(r)$

c. Translation key
v: Vanellope
r: Ralph
C(x): x crosses the finish line
E(x): x escapes
Translation: $(E(v) \wedge E(r)) \rightarrow C(v)$

Ausweis Midterm

3 a.

1.	$P \leftrightarrow \neg P$	
2.	P	
3.	$\neg P$	\leftrightarrow Elim (1,2)
4.	\perp	\perp Intro (2,3)
5.	$\neg P$	\neg Intro (2-4)
6.	P	\leftrightarrow Elim (1,5)
7.	\perp	\perp Intro (5,6)
8.	$\neg(P \leftrightarrow \neg P)$	\neg Intro (1-7)

b

1.	$(P \rightarrow Q) \rightarrow Q$	
2.	$\neg(P \vee Q)$	
3.	P	
4.	$P \vee Q$	\vee Intro (3)
5.	\perp	\perp Intro (2,4)
6.	Q	\perp Elim (5)
7.	$P \rightarrow Q$	\rightarrow Intro (3-6)
8.	Q	\rightarrow Elim (1,7)
9.	$P \vee Q$	\vee Intro (8)
10.	\perp	\perp Intro (2,9)
11.	$\neg\neg(P \vee Q)$	\neg Intro (2-10)
12.	$P \vee Q$	\neg Elim (11)

Answers Midterm

3 c.	1. $P \rightarrow Q$	
	2. $\neg P \rightarrow Q$	
	3. $\neg Q$	
	4. P	
	5. Q	\rightarrow Elim (1,4)
	6. \perp	\perp Intro (3,5)
	7. $\neg P$	\neg Intro (4-6)
	8. Q	\rightarrow Elim (2,7)
	9. \perp	\perp Intro (3,8)
	10. $\neg\neg Q$	\neg Intro (3-9)
	11. Q	\neg Elim (10)

d.	1. $a = b$	
	2. $a \neq c$	
	3. $c = b$	
	4. $a \neq b$	$=$ Elim (2,3)
	5. \perp	\perp Intro (1,4)
	6. $c \neq b$	\neg Intro (3-5)
	7. $a \neq c \rightarrow c \neq b$	\rightarrow Intro (2-6)
	8. $a = b \rightarrow (a \neq c \rightarrow c \neq b)$	\rightarrow Intro (1-7)

Answers Midterm

$$4 a. \neg(P \wedge (\neg Q \vee \neg R))$$

$$\Leftrightarrow$$

$$\neg(P \wedge (\neg Q \vee R))$$

$$\Leftrightarrow$$

$$\neg P \vee \neg(\neg Q \vee R)$$

$$\Leftrightarrow$$

$$\neg P \vee (\neg\neg Q \wedge \neg R)$$

$$\Leftrightarrow$$

$$\neg P \vee (Q \wedge \neg R)$$

$$b. \neg(P \wedge \neg Q) \wedge \neg(\neg S \vee R)$$

$$\Leftrightarrow$$

$$(\neg P \vee \neg\neg Q) \wedge \neg(\neg S \vee R)$$

$$\Leftrightarrow$$

$$(\neg P \vee Q) \wedge \neg(\neg S \vee R)$$

$$\Leftrightarrow$$

$$(\neg P \vee Q) \wedge (\neg\neg S \wedge \neg R)$$

$$\Leftrightarrow$$

$$(\neg P \vee Q) \wedge (S \wedge \neg R)$$

$$\Leftrightarrow$$

$$(\neg P \wedge S \wedge \neg R) \vee (Q \wedge S \wedge \neg R)$$

Answers Midterm

- 5 a. True
- b. False
- c. False
- d. True
- e. False
- f. False
- g. True
- h. True
- i. True
- j. False