

Solutions!

The Bronx High School of Science
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 Course: MGS21H - Honors Geometry

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* Note: Your proofs may vary slightly.

H.W #11

For the exercises below, write a full two-column proof.

1) Given: $a \vee b$
 $b \rightarrow c$
 $c \rightarrow d$
 $\sim d$
 Prove: a

Statements	Reasons
1. $b \rightarrow c$	1. Given.
2. $c \rightarrow d$	2. Given.
3. $b \rightarrow d$	3. Chain Rule (1, 2).
4. $\sim d$	4. Given.
5. $\sim b$	5. Law of Modus Tollens (3, 4)
6. $a \vee b$	6. Given
7. a	7. Law of Disjunctive Inference (5, 6)

Statements	Reasons
1. $s \rightarrow r$	1. Given.
2. $r \rightarrow q$	2. Given.
3. $s \rightarrow q$	3. Chain Rule (1, 2).
4. $\sim q$	4. Given.
5. $\sim s$	5. Law of Modus Tollens (3, 4)
6. $s \vee t$	6. Given.
7. t	7. Law of Disjunctive Inference (5, 6)
8. $t \rightarrow v$	8. Given.
9. v	9. Law of Detachment (7, 8)

2) Given: $s \vee t$
 $s \rightarrow r$
 $r \rightarrow q$
 $t \rightarrow v$
 $\sim q$
 Prove: v

3) Given: $d \rightarrow e$
 $d \vee f$
 $h \rightarrow \sim e$
 h
 Prove: f

Statements	Reasons
1. $h \rightarrow \sim e$	1. Given.
2. h	2. Given.
3. $\sim e$	3. Law of Detachment (1, 2)
4. $d \rightarrow e$	4. Given.
5. $\sim d$	5. Law of Modus Tollens (3, 4)
6. $d \vee f$	6. Given.
7. f	7. Law of Disjunctive Inference (5, 6)

Statements	Reasons
1. $\sim f \rightarrow g$	1. Given.
2. $g \rightarrow \sim h$	2. Given.
3. $\sim f \rightarrow \sim h$	3. Chain Rule (1, 2).
4. h	4. Given.
5. f	5. Law of Modus Tollens (3, 4)
6. $\sim f \vee j$	6. Given.
7. j	7. Law of Disjunctive Inference (5, 6)
8. $j \rightarrow k$	8. Given.
9. k	9. Law of Detachment (7, 8)

4) Given: $\sim f \rightarrow g$
 $\sim f \vee j$
 $g \rightarrow \sim h$
 $j \rightarrow k$
 h
 Prove: k

5) Given: $y \rightarrow z$
 $x \rightarrow y$
 $\sim z$
 $(\sim x \wedge \sim t) \rightarrow q$
 $\sim q$
 Prove: t

Statements	Reasons
1. $y \rightarrow z$	1. Given.
2. $\sim z$	2. Given.
3. $\sim y$	3. Law of Modus Tollens (1, 2).
4. $x \rightarrow y$	4. Given.
5. $\sim x$	5. Law of Modus Tollens (3, 4).
6. $(\sim x \wedge \sim t) \rightarrow q$	6. Given.
7. $\sim q$	7. Given.
8. $\sim(\sim x \wedge \sim t)$	8. Law of Modus Tollens (6, 7)
9. $x \vee t$	9. De Morgan's Laws (8)
10. t	10. Law of Disjunctive Inference (5, 9)

** Note: Show the use of the De Morgan's Laws explicitly!! You may be tempted to "fill up" steps 8 and 9 into a single step - show these separately.