Valid Arguments – Worksheet #2

Quote: George Pólya (1887–1985) *It is hard to have good ideas if we have little knowledge of the subject, and it is impossible if we have no knowledge. Good ideas are based on past ideas, experience, and recollections. Experience, intuition, and practice play large roles in the discovery of proofs.*

Exercises.   Write a proof to verify that each of the following is a valid argument.

1. p
$q \rightarrow \sim p$
$q \vee r$
   $\overline{\therefore r}$

2. $\sim p \rightarrow s$
$q \rightarrow \sim s$
q
   $\overline{\therefore p}$

3. $p \wedge q$
$\sim q \vee r$
$\sim r \vee s$
   $\overline{\therefore s}$

4. $p \rightarrow \sim q$
$q \vee \sim t$
$s \rightarrow (\sim s \vee t)$
$s \wedge w$
   $\overline{\therefore \sim p}$

5. $p \rightarrow q$
$p \vee r$
$\sim r$
   $\overline{\therefore q}$

6. $p \vee s$
$q \vee \sim s$
$\sim q \vee t$
   $\overline{\therefore p \vee t}$

7. p
$q \rightarrow \sim p$
$\sim q \rightarrow r$
$\sim r \vee s$
   $\overline{\therefore s}$

8. $\sim p \rightarrow s$
$q \rightarrow \sim s$
$\sim r \vee q$
$r \wedge t$
   $\overline{\therefore p}$

9. p
$(q \vee r) \rightarrow \sim p$
$s \rightarrow r$
$\sim t \vee w$
$\sim s \rightarrow t$
   $\overline{\therefore w}$

10. $p \rightarrow (q \rightarrow r)$
$\sim (s \wedge t)$
$\sim q$
$(q \rightarrow r) \rightarrow q$
$p \vee t$
   $\overline{\therefore \sim s}$