Proof of Theorem 269

The theorem to be proved is

q is a power of two $\quad \rightarrow \quad 0 < q$

Suppose the theorem does not hold. Then, with the variables held fixed,

(H) $\quad$ [[(q) is a power of two] $\quad$ & $\quad$ [$\neg$ (0) < (q)]]

Special cases of the hypothesis and previous results:

0: q is a power of two $\quad$ from $\quad$ H:q

1: $\neg\, 0 < q$ $\quad$ from $\quad$ H:q

2: $\neg$ 0 is a power of two $\quad$ from $\quad$ 134

3: $0 \leq q$ $\quad$ from $\quad$ 58;q

4: $0 < q \quad \vee \quad \neg\, 0 \leq q \quad \vee \quad 0 = q$ $\quad$ from $\quad$ $56^{\leftarrow}$;0;q

Equality substitutions:

5: $\neg\, 0 = q \quad \vee$ $\quad$ 0 is a power of two $\quad \vee \quad \neg\, q$ is a power of two

Inferences:

6: $\neg\, 0 = q \quad \vee$ $\quad$ 0 is a power of two $\quad$ by
0: q is a power of two
5: $\neg\, 0 = q \quad \vee$ $\quad$ 0 is a power of two $\quad \vee \quad \neg\, q$ is a power of two

7: $\neg\, 0 \leq q \quad \vee \quad 0 = q$ $\quad$ by
1: $\neg\, 0 < q$
4: $0 < q \quad \vee \quad \neg\, 0 \leq q \quad \vee \quad 0 = q$

8: $\neg\, 0 = q$ $\quad$ by
2: $\neg$ 0 is a power of two
6: $\neg\, 0 = q \quad \vee$ $\quad$ 0 is a power of two

9: $0 = q$ $\quad$ by
3: $0 \leq q$
7: $\neg\, 0 \leq q \quad \vee \quad 0 = q$

10: QEA $\quad$ by
8: $\neg\, 0 = q$
9: $0 = q$