Section 1.2

1. $e \to a$

2. You can see the movie [only if] you are over 18 years old or you have the permission of a parent. Express your answer in terms of m: "You can see the movie," e: "You are over 18 years old," and p: "You have the permission of a parent."
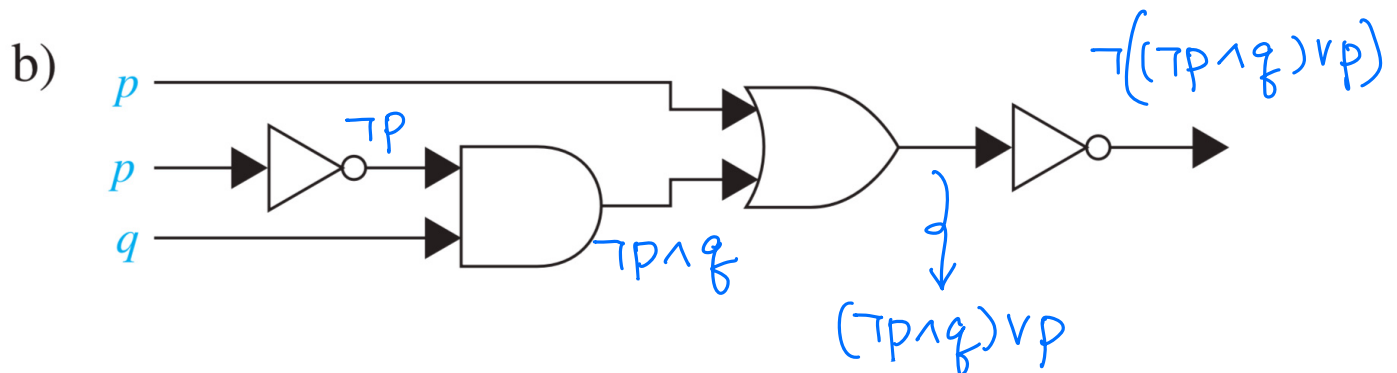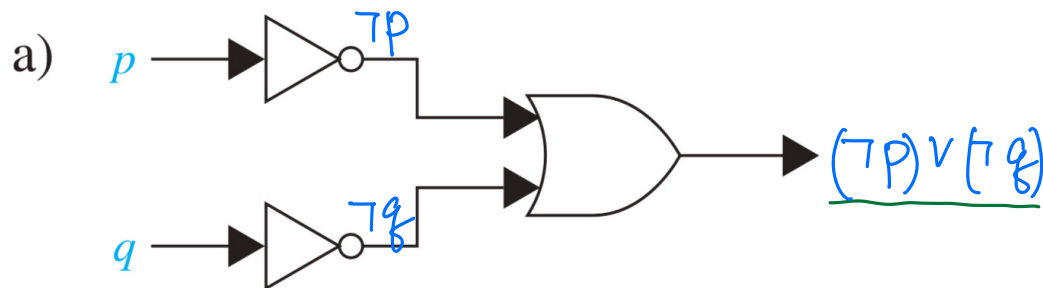
Sol: "p only if q" means "if p, then q".

The original proposition is m only if e or p, then we have

$$m \longrightarrow (e \lor p)$$

3. $g \to (r \land (\neg m) \land (\neg b))$

7. a) $q \to p$ **b)** $q \land \neg p$ **c)** $q \to p$ **d)** $\neg q \to \neg p$

44. Find the output of each of these combinatorial circuits.

a)

$\neg p$
$\neg q$
$(\neg p) \lor (\neg q)$

b)

$\neg p$
$\neg p \land q$
$\neg((\neg p \land q) \lor p)$
$(\neg p \land q) \lor p$

45. a) $\neg(p \land (q \lor \neg r))$ **b)** $((\neg p) \land (\neg q)) \lor (p \land r)$