e) Since the condition is true when it is encountered (since \( x = 1 \)), the statement is executed, so \( x \) is incremented and now has the value 2. (It is irrelevant that the condition is now false.)

44. a) \( 1 \ 0000 \land (0 \ 1011 \lor 1 \ 011) = 1 \ 0000 \land 1 \ 011 = 1 \ 000 \)
b) \( (0 \ 1111 \land 1 \ 0101) \lor 0 \ 1000 = 0 \ 0101 \lor 0 \ 1000 = 0 \ 1101 \)
c) \( (0 \ 1010 \land 1 \ 011) \lor 0 \ 1000 = 1 \ 0001 \lor 0 \ 1000 = 1 \ 0001 \)
d) \( (1 \ 0111 \land 0 \ 1010) \land (1 \ 0001 \lor 1 \ 1011) = 1 \ 0111 \land 1 \ 1011 = 1 \ 1011 \)

46. The truth value of “Fred and John are happy” is \( \min(0.8, 0.4) = 0.4 \). The truth value of “Neither Fred nor John is happy” is \( \min(0.2, 0.6) = 0.2 \), since this statement means “Fred is not happy, and John is not happy,” and we computed the truth values of the two propositions in this conjunction in Exercise 45.

48. This cannot be a proposition, because it cannot have a truth value. Indeed, if it were true, then it would be truly asserting that it is false, a contradiction; on the other hand if it were false, then its assertion that it is false must be false, so that it would be true—again a contradiction. Thus this string of letters, while appearing to be a proposition, is in fact meaningless.

50. No. This is a classical paradox. (We will use the male pronoun in what follows, assuming that we are talking about males shaving their beards here, and assuming that all men have facial hair. If we restrict ourselves to beards and allow female barbers, then the barber could be female with no contradiction.) If such a barber existed, who would shave the barber? If the barber shaved himself, then he would be violating the rule that he shaves only those people who do not shave themselves. On the other hand, if he does not shave himself, then the rule says that he must shave himself. Neither is possible, so there can be no such barber.

SECTION 1.2 Applications of Propositional Logic

2. Recall that \( p \) only if \( q \) means \( p \rightarrow q \). In this case, if you can see the movie then you must have fulfilled one of the two requirements. Therefore the statement is \( m \rightarrow (c \lor p) \). Notice that in everyday life one might actually say “You can see the movie if you meet one of these conditions,” but logically that is not what the rules really say.

4. The condition stated here is that if you use the network, then either you pay the fee or you are a subscriber. Therefore the proposition in symbols is \( w \rightarrow (d \lor s) \).

6. This is similar to Exercise 2: \( u \rightarrow (b_{32} \land g_1 \land r_1 \land h_{16}) \lor (b_{64} \land g_2 \land r_2 \land h_{32}) \).

8. a) “But” means “and”: \( r \land \neg p \).
b) “Whenever” means “if”: \( (r \land p) \rightarrow q \).
c) Access being denied is the negation of \( q \), so we have \( \neg r \rightarrow \neg q \).
d) The hypothesis is a conjunction: \( (\neg p \land r) \rightarrow q \).

10. We write these symbolically: \( u \rightarrow \neg a \), \( a \rightarrow s \), \( \neg s \rightarrow \neg u \). Note that we can make all the conclusion true by making \( a \) false, \( s \) true, and \( u \) false. Therefore if the users cannot access the file system, they can save new files, and the system is not being upgraded, then all the conditional statements are true. Thus the system is consistent.