

1.1.16)

- |                          |                                 |
|--------------------------|---------------------------------|
| a) $r \wedge \neg q$     | d) $p \wedge \neg q \wedge r$   |
| b) $p \wedge q \wedge r$ | e) $p \wedge q \rightarrow r$   |
| c) $p \leftrightarrow r$ | f) $r \leftrightarrow p \vee q$ |

1.1.20)

- |         |          |
|---------|----------|
| a) true | c) false |
| b) true | d) true  |

1.1.22)

- a) inclusive or, because having both is a positive.
- b) exclusive or, you can choose only 1.
- c) inclusive or, you can have all the options.
- d) exclusive or, you can't both publish and perish.

1.1.24)

- a) If you get promoted, then you should warn your boss' car.
- b) If there are south winds, then there will be a spring thaw.
- c) If you bought the computer less than a year ago, then the warranty is good.
- d) If Willy cheats, then he gets caught.
- e) If you can access the website, then you pay the sub fee.
- f) If you know the right people, then you get elected.
- g) If Carol is on a boat, then she gets seasick.



1.1.30)

a) converse - If I stay at home then it will snow.

inverse - If it does not snow tonight, then I will not stay at home.

contrapositive - If I don't stay at home tonight then it won't be snowing.

b) converse - If I go to the beach, then it is a sunny day.

inverse - If it is not a sunny summer day, then I don't go to the beach.

contrapositive - If I don't go to the beach, then it is not a sunny day.

converse c) If I need to sleep until noon, then I stay up late.

inverse - If I don't stay up late, then I don't need to sleep late.

contrapositive - If I don't need sleep until noon, then I stayed up late.

1.1.32)

a) 4

c) 64

b) 8

d) 32

1.1.34)

d) P Q  $(P \vee Q)$   $(P \wedge Q)$   $(P \wedge Q \rightarrow P \vee P)$

T T T T T

T F T F T

F T T F T

F F F F T

e) P Q  $\neg P$   $(Q \rightarrow \neg P)$   $P \leftrightarrow Q$   $(Q \rightarrow \neg P) \leftrightarrow (P \leftrightarrow Q)$

T T F F T F

T F F T F F

F T T T F F

F F T T T T

f)	P	Q	$\neg Q$	$P \leftrightarrow Q$	$P \leftrightarrow \neg Q$	$(P \leftrightarrow Q) \oplus (P \leftrightarrow \neg Q)$
	T	T	F	T	F	T
	T	F	T	F	T	T
	F	T	F	F	T	T
	F	F	T	T	F	T

1.2.4

If w, then (d or s)", if-then  $\rightarrow$ , or  $\vee$ ,

$$\boxed{w \rightarrow (d \vee s)}$$

1.2.6

a)  $r \wedge \neg q$

c)  $\neg r \rightarrow \neg d$

b)  $(r \wedge p) \rightarrow d$

d)  $(\neg p \wedge r) \rightarrow q$

1.2.24

A: Both cannot be knights, so A is a knave.

B: Can be correct, so B is a knight.