

1. Consider the following translation key:

p : Human beings will arrive to Mars.

q : Human beings build a ship capable of interplanetary flight.

Now, say whether the following statements are true or false:

- (a) ' $p \rightarrow q$ ' is the correct translation of 'Human beings will arrive to Mars only if human beings build a ship capable of interplanetary flight.' **Correct**
- (b) ' $p \rightarrow q$ ' is the correct translation of 'If human beings build a ship capable of interplanetary flight, then human beings will arrive to Mars.' **Incorrect. The correct translation is ' $q \rightarrow p$ '.**
- (c) ' $p \rightarrow \neg q$ ' is the correct translation of 'Human beings will arrive to Mars unless human beings build a ship capable of interplanetary flight.' **Incorrect. The correct translation is ' $\neg q \rightarrow p$ '.**
2. Which steps should I follow in order to translate an argument into propositional logic and determine whether it is valid? **I should determine what the simple sentences are, create a translation key, create a translation of the argument, and then do a truth-table in order to see whether there is any row with true premises and a false conclusion. If there is, the argument is invalid; if there isn't, it is invalid.**
3. Translate the following arguments into propositional logic and determine whether they are valid:
- (a) If God is all powerful, then God can make the number 5 even. But it's neither the

case that it is possible that the number 5 is even nor that God cannot make the number 5 even. Therefore, God is all powerful.

p : God is all powerful.

q : God can make the number 5 even.

r : It is possible that the number 5 is even.

Translation: $p \rightarrow q, \neg(r \vee \neg q) \models p$

This argument is invalid.

- (b) I see a stopped clock that says '2pm' at 2pm. If I see a stopped clock that says '2pm' at 2pm, then I have a justified belief that it is 2pm. If I see a stopped clock that says '2pm' at 2pm, it is 2pm. If I have a justified belief that it is 2pm and it is 2pm, then I know that it is 2pm. In conclusion, I see a stopped clock that says '2pm' at 2pm only if I know that it is 2pm.

p : I see a stopped clock that says '2pm' at 2pm.

q : I have a justified belief that it is 2pm.

r : It is 2pm.

s : I know it is 2pm.

Translation: $p, p \rightarrow q, p \rightarrow r, (q \wedge r) \rightarrow s \models p \rightarrow s$

This argument is valid.

- (c) Harry Potter exists unless I can truthfully say 'Harry Potter does not exist'. But if I

can truthfully say 'Harry Potter does not exist', then I can say of an object that it has the property of not existing. And I cannot say of an object that it has the property of not existing. Therefore, Harry Potter exists.

p : Harry Potter exists.

q : I can truthfully say 'Harry Potter does not exist'.

r : I can say of an object that it has the property of not existing.

Translation: $\neg q \rightarrow p, q \rightarrow r, \neg r \models p$

This argument is valid.