

Practice 4

1. **Symbolize the following proposition and discuss the truth.**

- a) Assume $Y(x)$ x refers to all people, $F(x)$ x refers to black hair people
The symbolization of proposition is $x(Y(x) \rightarrow F(x))$
But assume there is a yellow hair man, then $Y(x)$ is true but $F(x)$ is false
So, the symbolization is false and so do the proposition
- b) Assume $Y(x)$ x refers to people, $F(x)$ x refers to boarded on the moon
The proposition symbolization is $x(Y(x) \wedge F(x))$
Armstrong boarded on the moon
Proposition is true
- c) Assume $Y(x)$ x refers to people, $F(x)$ x refers to boarded on the Jupiter
The proposition symbolization is $x(Y(x) \wedge F(x))$
Yet no one has boarded Jupiter
Proposition is false
- d) Assume $Y(x)$ x refers to students, $A(x)$ x refers to studying in the US, $F(x)$ x refers to Asians
The symbolization of proposition is $x(\neg(Y(x) \wedge A(x)) \rightarrow F(x))$
Clark is an Africa student studying in US, he is not an Asian
Proposition is true

2. **Judge the following formula, which is tautology? What is the contradiction?**

- a) Tautology, $\neg \forall x \forall y G(x, y) \Rightarrow \forall x F(x)$
- b) Not tautology, $(\forall x F(x) \Rightarrow \exists y G(y)) \wedge \exists y G(y)$
- c) Tautology, $\neg \exists x (F(x) \Rightarrow G(y))$

3. **Which of the following are correct?**

- a) False
- b) True
- c) True
- d) False
- e) False

4. $P \wedge (Q \Rightarrow R) \Rightarrow S$; $P \wedge (\neg Q \vee R) \Rightarrow S$; $\neg (P \wedge (\neg Q \vee R)) \vee S$; $\neg (P \wedge (\neg Q \vee R)) \vee S$;
 $\neg (P \vee S) \wedge \neg ((\neg Q \vee R) \vee S)$; $\neg (P \vee S) \wedge ((Q \vee \neg R) \vee \neg S)$;
 $(\neg P \vee \neg S) \wedge (Q \vee \neg R \vee \neg S)$

5. $\forall x \text{ Even}(x)$

$\forall x \text{ Prime}(x)$

$\forall z \text{ Even}(z) \Rightarrow \exists x \exists y g(\text{Prime}(x), \text{Prime}(y))$