CSE 15: Homework 2

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Knowledge Representation

- It is not cloudy and it is not raining.
  - p = It is not cloudy
  - q = it is not raining
  - $-p \wedge -q$
- I like to eat apples and bananas.
  - p = I like to eat apples
  - q = I like to eat bananas
  - $p \wedge q$
- Behind the clouds the sun is shining.
  - p = Behind the clouds the sun is shining
  - p
- If a function is differentiable then the function is continuous.
  - p = If a function is differentiable
  - q = The function is continuous
  - $p \rightarrow q$
- I will study for the final otherwise I will fail.
  - p = I will study for the final
  - q = I will fail
  - $p \rightarrow q$

Equivalence in Propositional Logic

- $p \wedge q$ and $p \vee \neg q$

p	q	$p \wedge q$	$p \vee \neg q$
0	0	0	1
0	1	0	0
1	0	0	1
1	1	1	1

  - They are not equivalent
  - p = True, q = False
  - $True \wedge False = False$
  - $True \vee \neg False = True$

- $p \vee q$ and $\neg p \vee \neg q$

p	q	$p \vee q$	$\neg p \vee \neg q$
0	0	0	1
0	1	1	1
1	0	1	1
1	1	1	0

  - They are not equivalent.
  - p = False, q = False
  - $False \vee False = False$
  - $\neg False \vee \neg False = True$

- $p \rightarrow q$ and $\neg q \rightarrow \neg p$

p	q	$p \rightarrow q$	$\neg q \rightarrow \neg p$
0	0	1	1
0	1	1	1
1	0	0	0
1	1	1	1

  - They are equivalent
  - The rows on the Truth Table match

- $p \rightarrow q$ and $\neg p \vee q$

p	q	$p \rightarrow q$	$\neg p \vee q$
0	0	1	1
0	1	1	1
1	0	0	0
1	1	1	1

  - They are equivalent

  - The rows on the Truth Table match

- $\neg(p \wedge q)$ and $\neg p \vee \neg q$

p	q	$\neg(p \wedge q)$	$\neg p \vee \neg q$
0	0	1	1
0	1	1	1
1	0	1	1
1	1	0	0

  - They are equivalent
  - The rows on the Truth Table match