

Homework 1

due Thursday June 25th

1. (a) Use truth tables to prove

$$\sim (P \wedge Q) \equiv (\sim P) \vee (\sim Q).$$

- (b) Use the equivalence from part (a) to write the negation of the statement:
The function $f(x) = x^2$ has positive first and second derivatives at $x = 1$.

2. Section 1.1: # 2(g), 3(d), 7, 8(b)(e).

3. Section 1.2: # 4(a)(d)(g), 6(d), 14(a)(b).

4. Rewrite each of the following statements using logical symbols and then negate them.

- (a) For every real number x the function $f(x) = x^3$ satisfies the property $f(x) = f(-x)$.

- (b) For all real numbers x there is a real number y so that $x = e^y$.

- (c) For all real numbers ϵ greater than 0, there exists a natural number N so that when n and m are both natural numbers greater than N , for all x in the interval $[0, 1]$ we have $|x^m - x^n| < \epsilon$.

5. Section 1.3: # 5(a)(g).