Homework 1 [Due 9/03]

Problem 1. Consider the statement $2+3=5$. Do you think this is a true statement? If so, in what sense is it true? Do you think this statement requires any justification at all? Can you provide any justification?

If you think this is an odd or even silly question, please feel free to say so, together with any comments.

Problem 2. Find the maximum and minimum values of the function $f(x)=2x^3-12x^2+18x$ on the interval $[0,3]$. *Explain each step clearly*.

Problem 3. You are probably able to tell that the fairly large number 178930246 is an even number (almost instantaneously). The technique is very simple: In decimal notation, if the last digit of a number is even, then this number must be even, and vice versa. *Explain why this technique works.*

Problem 4. There is a technique (similar to the above one) that enables one to determine, very quickly, if a number is divisible by 3: In decimal notation, if the sum of the digits of a number is divisible by 3, then this number is divisible by 3. For example, without much effort, you can tell the number 103602 is divisible by 3 because the sum of the digits $1+0+3+6+0+2=12$ is divisible by 3. *Explain why this technique works.*

If you have trouble explain why, try restricting to just the cases of the 2-digit numbers or the 3-digit numbers only.

Problem 5. Is it true that 10^k-1 is divisible by 9 for any positive integer k ? Justify your answer.

If you cannot fully justify your answer, please write down your think process.

Problem 6. Explain the following concepts in the context of Chapter 2: Statement, negation, disjunction, conjunction, and implication.