MATH 1090.03D

Fall 2000

Posted: Nov. 16, 2000

Due: Dec. 4, 2000—►**In class**◄

Problem Set No. 5—The last one! (On Ch.9 of "GS").

In the following problems you can use **any** tools that we have (e.g., Calculational/Equational proofs, Modus Ponens, Generalization/Specialization, Hilbert-style proofs, Post's Theorem, Deduction Theorem, Proof by contradiction, Monotonicity, etc.). Before you start a proof, think about the problem and choose the most convenient approach.

You should remember (and use, when appropriate) the following fact from class:

$$A \equiv B \vdash A \Rightarrow B \text{ and } A \equiv B \vdash B \Rightarrow A$$

and

$$A \Rightarrow B, B \Rightarrow A \vdash A \equiv B$$

which means that to prove $\Gamma \vdash A \equiv B$ you can do so by proving two things: $\Gamma \vdash A \Rightarrow B$ and $\Gamma \vdash B \Rightarrow A$.

- Do the following problems from the text, Chapter 9.

- 9.5, 9.7, 9.8, 9.9, 9.17, 9.19, 9.26, 9.28.

There is a typo in the text: In Problem 9.28 it says "x does not occur free in P". **Please correct this to say: "x does not occur free in Q".**

Also prove (these use Ax5 and Ax6):

- Prove $\vdash x \approx y \Rightarrow y \approx x$.
- Prove $\vdash x \approx y \wedge y \approx z \Rightarrow x \approx z$.