MATH1061/MATH7861 Mid-semester Test 1 Information

**Date:** Tuesday 31 August 2004  
**Time:** 9.10am - 10.10am (55 minutes with 5 minutes perusal)  
**Place:** Usual lecture room

There are 45 marks allocated on the paper. This is roughly 1 mark per minute, with 10 extra minutes. Pocket calculators are allowed. This exam counts as 15% towards your final assessment, **but only if it helps you.**

**Q1.** Show that a given statement form is a tautology, a contradiction or neither (3 marks).

**Q2.** Three parts. Create an input/output table corresponding to a given scenario (1 mark). Write a logical expression for the output (2 marks). Draw a circuit diagram (2 marks).

**Q3.** Two parts. Write an argument in symbolic form (2 marks). Use a truth table to determine if the argument is valid or invalid (4 marks).

**Q4.** Three parts. First part is: given a statement in english, write it in symbols (1 mark), write the negation in symbols (1 mark), and decide which of the original or negation is true (1 mark). Second part is the same, but given a different initial statement (again, 3 marks in total). Third part is: given a statement in symbols, write it in english (3 marks).

**Q5.** Use direct proof to prove a statement about divisibility (5 marks).

**Q6.** Prove a statement about rational/irrational numbers using proof by contradiction (6 marks).

**Q7.** Two parts. Apply the Euclidean algorithm to find the gcd of two numbers (2 marks), then use this to find a solution to a linear Diophantine equation (3 marks).

**Q8.** Three parts, each worth 2 marks. In each case you are given a statement which is false, and you are asked to show that the statement is false by giving a counterexample.