

The Logic part of the M381 was rewritten for the 2004 presentation. Most of the content of the revised and old courses are similar. I think it is worthwhile looking at the old papers. Below I have given some information on the changes you should make to these papers before tackling them.

### **2000-3 Question 9 & Question 11 part (i)**

Delete these. Prior to 2004 these questions covered Turing and Abacus machines.

### **2000-3 Question 13**

Note that  $-$  is used instead of  $\neg$  in papers prior to 2004. Ignore the  $()$  around line numbers in the Justification part of proofs.

### **2000 Question 10**

Part (i). Replace the 1<sup>st</sup> 3 lines by

*The function  $f: \mathbb{N} \rightarrow \mathbb{N}$  is defined as  $f(n) = \text{succ}(n)$  and the function  $g: \mathbb{N}^3 \rightarrow \mathbb{N}$  is defined as  $g(n_1, n_2, n_3) = \text{add}(\text{succ}(n_3), \text{succ}(n_2))$ . Let the function  $h: \mathbb{N}^2 \rightarrow \mathbb{N}$  be obtained from  $f$  and  $g$  by primitive recursion.*

Part (ii). Replace "initial" by "basic primitive recursive" (twice).

Part (iii). Replace " $\text{Mn}[f](x_1, x_2)$ " by " $\mu y(f(x_1, x_2, y) = 0)$ ".

### **2000 Question 11**

Part (ii). Insert "*except where indicated,*" after "functions"

Part (ii)(a). Insert "*(In this part of the question you may not use the facts that any of the relations  $\leq, \geq, <, >$  and the relation eq of equality are primitive recursive unless you prove them)*".

Part (ii)(b). Insert "*(In this part of the question you may not use the facts that any of the functions min and max are primitive recursive unless you prove them)*".

### **2000 Question 12**

Part (ii). Insert "*(In this part of the question you may not use Theorem 3.1 of Unit 2 on Bounded Summation.)*".

**2002 Question 10**

Part (i). Replace the 1<sup>st</sup> 3 lines by

*The function  $f: \mathbb{N} \rightarrow \mathbb{N}$  is defined as  $f(n) = \text{succ}(\text{succ}(n))$  and the function  $g: \mathbb{N}^3 \rightarrow \mathbb{N}$  is defined as  $g(n_1, n_2, n_3) = \text{mult}(\text{succ}(n_3), \text{succ}(n_2))$ . Let the function  $h: \mathbb{N}^2 \rightarrow \mathbb{N}$  be obtained from  $f$  and  $g$  by primitive recursion.*

Part (ii). Replace "initial" by "basic primitive recursive" (twice). Replace "sum" by "add" (twice).

Part (iii). Replace " $\text{Mn}[f](x_1, x_2)$ " by " $\mu y(f(x_1, x_2, y) = 0)$ ".

**2002 Question 11**

Part (ii). Insert ", except where indicated," after "functions"

Part (ii)(a). Insert "(In this part of the question you may not use the facts that any of the relations  $\leq, \geq, <, >$  and the relation eq of equality are primitive recursive unless you prove them)".

Part (ii)(b). Insert "(In this part of the question you may not use the facts that any of the functions min and max are primitive recursive unless you prove them)".

**2003 Question 10**

Part (i). Replace the 1<sup>st</sup> 3 lines by

*The function  $f: \mathbb{N} \rightarrow \mathbb{N}$  is defined as  $f(n) = \text{succ}(n)$  and the function  $g: \mathbb{N}^3 \rightarrow \mathbb{N}$  is defined as  $g(n_1, n_2, n_3) = \text{exp}(\text{succ}(n_2), \text{succ}(n_3))$ . Let the function  $h: \mathbb{N}^2 \rightarrow \mathbb{N}$  be obtained from  $f$  and  $g$  by primitive recursion.*

Part (ii). Replace "initial" by "basic primitive recursive" (twice).

Part (iii). Replace " $\text{Mn}[f](x_1, x_2)$ " by " $\mu y(f(x_1, x_2, y) = 0)$ ".

**2003 Question 11**

Part (ii). Replace "e, Eq and d" by "where indicated "

Part (ii)(a). Insert "(In this part of the question you may not use the facts that any of the relations  $\leq, \geq, <, >$  and the relation eq of equality are primitive recursive unless you prove them)".

Part (ii)(b). Insert "(In this part of the question you may not use the facts that the set E of even numbers is primitive recursive unless you prove it)".

**2003 Question 12**

Part (ii). Insert "*(In this part of the question you may not use Theorem 3.1 of Unit 2 on Bounded Summation.)*".