## Department of pplied Mathematics Preliminary Examination in Numerical nalysis January 2014

Submit solutions to four (and no more) of the following six problems. Justify all your answers.

## 1. Root Finding.

Construct a continuous function f(x), defined over  $x \ge (7;7)$  such that, for an starting point  $x_0$  that is not itself a root, the Me ton iterations for solving f(x) = 0 ill be uniquel defined, sta bounded, but nevertheless fail to converge.

## 2. Numerical uadrature.

The trapezoidal rule has error  $O(h^2)$  and Simpson's rule error  $O(h^4)$ , in both cases ith even po ers onl in their full error expansions. These are the first t o members of the Me ton-Cotes famil of methods, ith errors (starting from the trapezoidal case) h raised to 2, 4, 4,

## 4. Linear Algebra