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**Math-5630/6630**  
Introduction to Numerical Analysis I  
Summer 2007  
Homework 1

1. Use Matlab and perform the following commands:

- a. eps
- b. realmin
- c. realmax

What are these values?

2. Use Matlab to perform the following operations, explain the results you obtained, did you obtain the expected results?

- a.  $1 + \text{eps} - 1$
- b.  $1 + \text{eps}/2 - 1$
- c.  $\text{realmin}/1\text{e}10$
- d.  $\text{realmin}/1\text{e}16$
- e.  $\text{realmax} * 10$
- f.  $5/0$
- g.  $-113/0$
- h.  $\text{inf} / -1$
- i.  $\text{inf}/\text{inf}$
- j.  $1 + \text{nan}$
- k.  $\text{nan} * 0$

\*3. a. Consider the problem of finding roots of the polynomial  $x^2 + bx + 1 = 0$ . If the data is  $b$  and the solution operator is  $G(b) = (-b \pm \sqrt{b^2 - 4})/2$ , find (approximate) the condition number  $\mathcal{K}(b)$ , is the problem well conditioned, or ill conditioned, explain.

b. Repeat the above for the polynomial  $x^2 + x + c = 0$ , now the data is  $c$ .

\* Math 6630.