f

$\tilde{x}_1, \tilde{x}_2 \cdots \tilde{x}_n$

```
public double partialDeriv (double[] tildex, int i, double h){
        double tilde y = f(tilde x);
        ~~double[]~~
        int n = tildex.length;
        double[] x_mod = new double[n];
        for(j=0; j<n; j++)
          { x_mod[j] = tildex[j]; }
            x_mod[i] += h;
            double y_mod = f(x_mod);
        return (y-mod - y-tilde)/hi;
    }
public double f(double[]x){
    double sum = 0.0;
    for(int i=0; i<x.length; i++)
        { sum += x[i]; }
    return sum;
    }
```

Thurs Sept 25th - preview of the test

Tue Sept 30th - test.

Thurs Oct 2nd - work on your project day.

Tue Oct 6th - Report.

Mon Sept 29th.

Additional part:

R. Bafer Kearfott -

10^{30} - 11^{20} pm

TRCR

Friday, 12 pm. - post-conf workshop

Templeton suite

Sat - Oct 5 until noon

$\boxed{\text{NSF}}$

Problem:

we have: $f(x_1, x_2 \cdots x_n)$

$\tilde{x}_1, \tilde{x}_2 \cdots \tilde{x}_n$

$\sigma_1, \sigma_2, \cdots \sigma_n$.

We want: $\tilde{y}$, $\sigma \rightarrow$ we want.

Algorithm:

$$\sigma = \sqrt{\sum_{i=1}^{n} \left(f(x_1, \cdots x_{i-1}, x_i + \sigma_i, x_{i+1}, \cdots x_n) - \tilde{y} \right)^2}$$

We did: small n

- we used numerical differentiation as main tool.
- we used simulations (which run much longer) to check on results.

Monte Carlo Simulations: $\tilde{y} = f(\tilde{x}_1, \cdots \tilde{x}_n)$

Fix some no of iterations N

for each iteration $K = 1, \cdots N$

* simulate meas. errors $\Delta x_i^{(k)} = \sigma_i * \text{gauss}()$;
* simulate the actual values $x_i^{(k)} = \tilde{x}_i - \Delta x_i^{(k)}$
* simulate y; $y^{(k)} = f(x_1^{(k)}, \cdots x_n^{(k)})$
* simulate $\Delta y^{(k)} = \tilde{y} - y^{(k)}$

$$\sigma = \sqrt{\frac{1}{N} \sum_{k=1}^{N} (\Delta y^{(k)})^2}$$

HW: To write a program to generate σ using Monte-Carlo method.

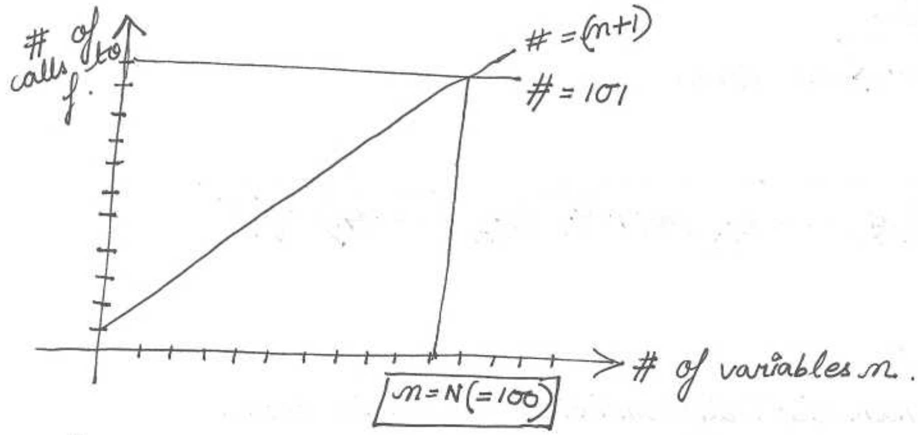
Accuracy $\approx \frac{1}{\sqrt{N}}$ 3%, $N = 1000$

10%, $N = 100$

Main time : computing f.

numerical diff : $(n+1)$ calls to f.

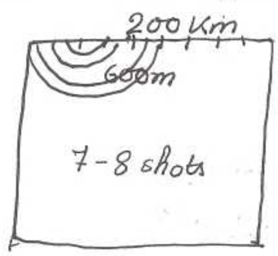
Monte - Carlo : $(N+1)$ calls to f.



If we have ~~vo~~ # of variables $> N \Rightarrow$ Monte Carlo

" " " " $< N \Rightarrow$ numerical diff

Geosciences Experiment:



$300 \cdot 7 = 2{,}000$

Optimal Curve: