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## Algorítmica – Práctica 1 – Ejercicio 3 - 2ºD

### 3.- Permutación:

- Código Fuente:

```
Permutacion::Permutacion(unsigned int n,int numero_generar){
    unsigned int total = numero_generar;
    if (numero_generar==-1){
        total =1;
        for (unsigned int i=2;i<=n;i++)
            total*=i;
    }

    datos= vector<vector<unsigned int> >(total,
                                         vector<unsigned int>(n,0));
    int nivel=0;
    unsigned int pos=0;
    do{
        GenerarSiguiente(nivel,pos);
        if (EsPermutacion(nivel,pos)){
            if (pos<datos.size()-1)
                datos[pos+1]=datos[pos];
            pos++;
        }
        if (pos<total && PosiblePermutacion(nivel,pos))
            nivel=nivel+1;
        else{
            while (nivel>=0 && pos<total && !MasHermanos(nivel,pos)){
                datos[pos][nivel]=0;
                nivel=nivel-1;
            }
        }
    }while (nivel>=0 && pos<total);
}
```

- Hardware:

Procesador: Intel® Core™ i5-3350P CPU @ 3.10GHz × 4  
Memoria RAM: 8GB

- Sistema Operativo:

Ubuntu 14.04

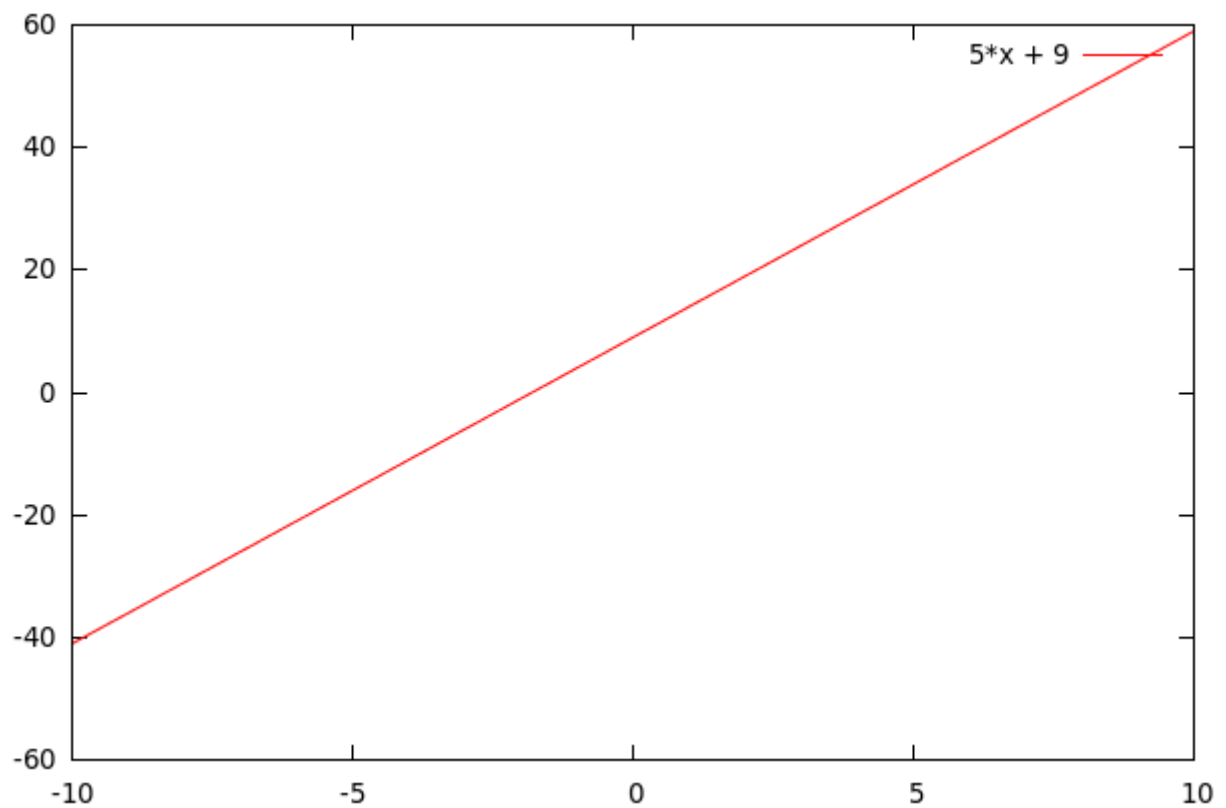
- Compilador Utilizado:

g++ -std=c++11

a) Caso Mejor:

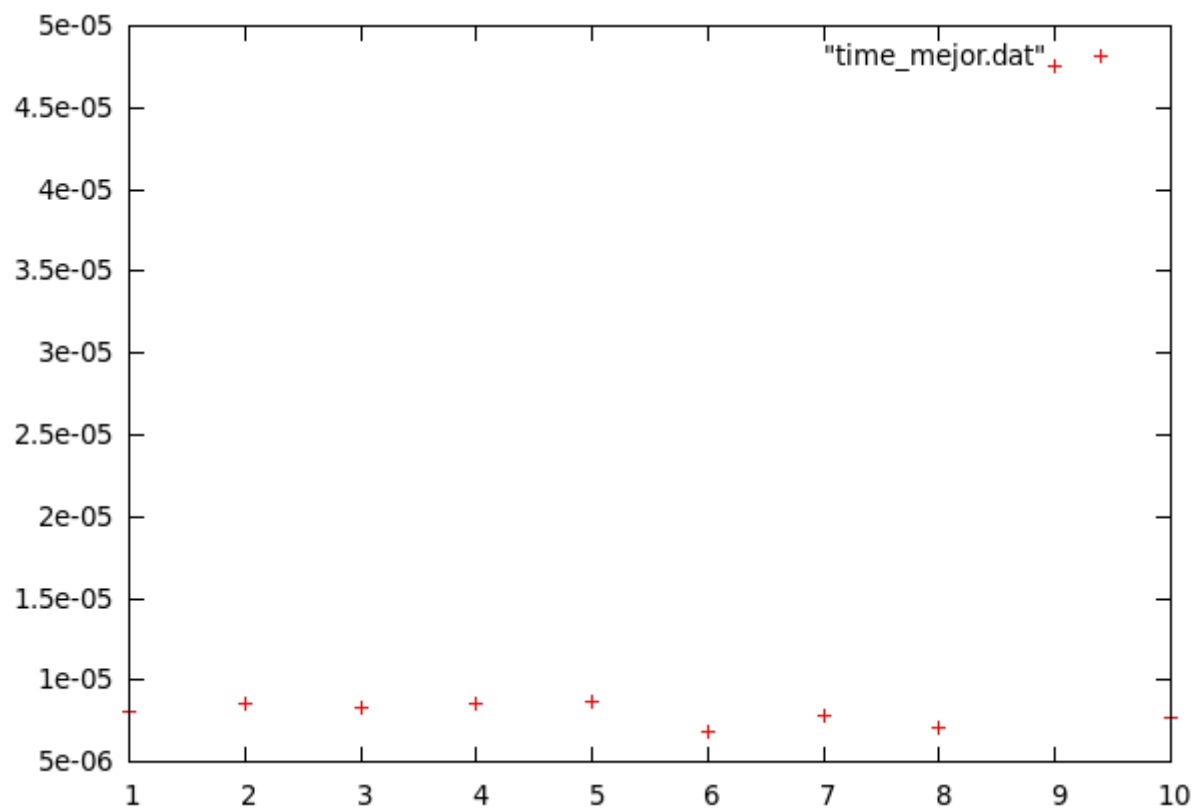
- Eficiencia Teórica:

$$\begin{aligned}T_m(n) &= 5 + 1 + 2 + 1 + \sum_{i=0}^n (1 + 1 + 2 + 1) \\&= 5n + 9 \\f(x) &= 5 * x + 9 \\&\text{plot } f(x)\end{aligned}$$



- Eficiencia empírica:

plot "time\_mejor.dat"

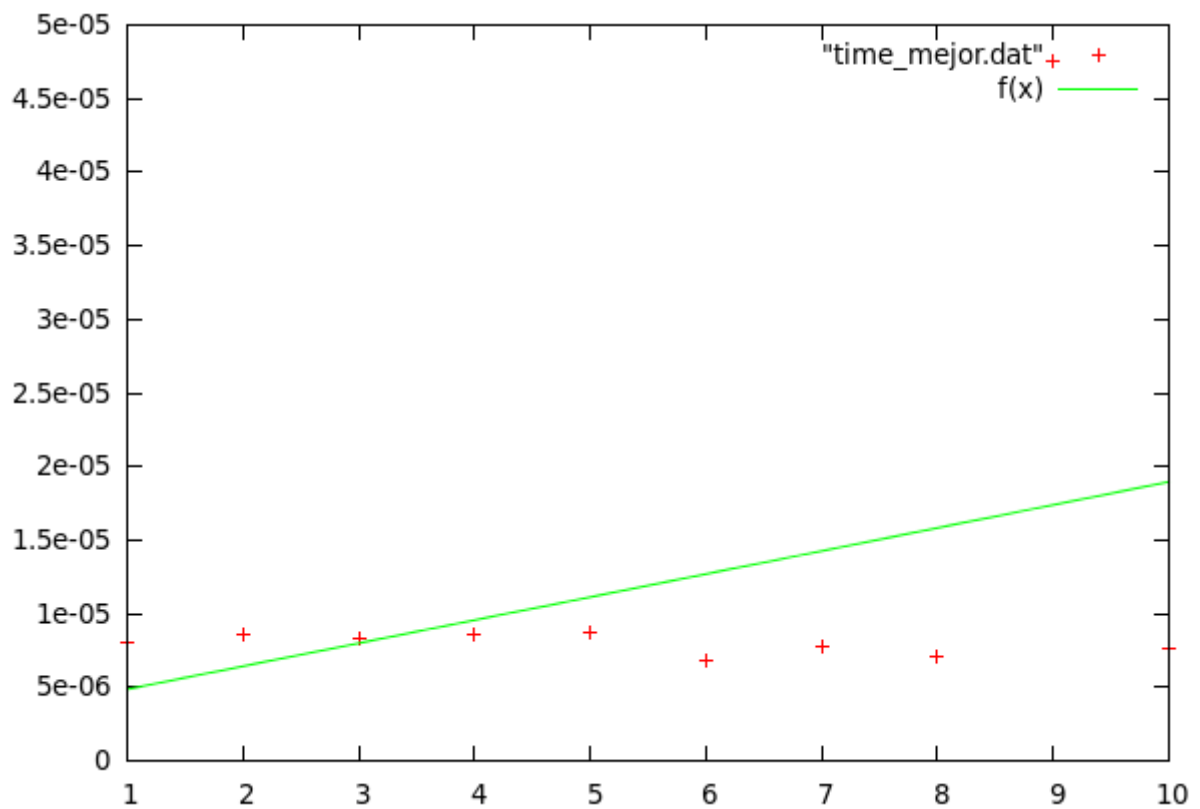


- Ajuste:

$$f(x) = a \cdot x + b$$

fit  $f(x)$  "time\_mejor.dat" via  $a, b$

plot "time\_mejor.dat",  $f(x)$



b) Caso Peor:

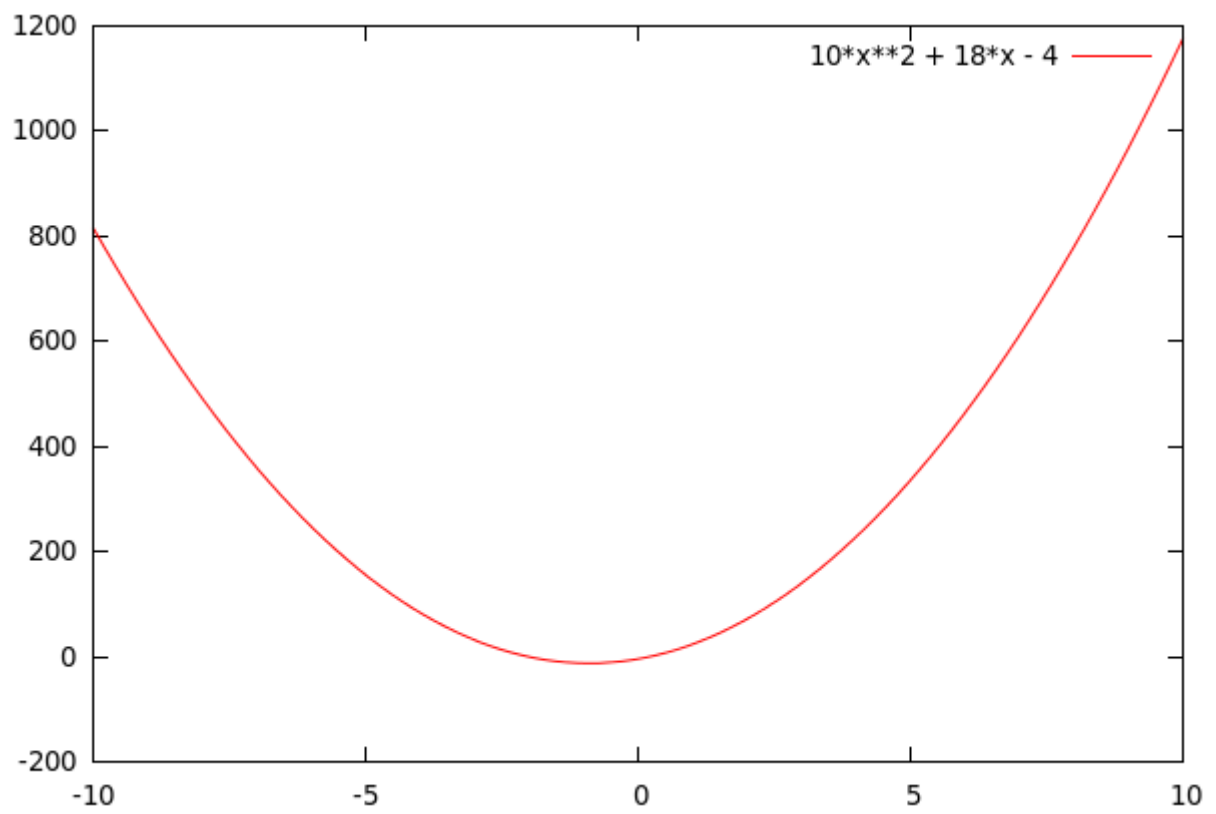
- Eficiencia Teórica:

$$T_p(n) = 3 + \sum_{i=2}^n (2 + 2 + 1) + 3 + \sum_{i=0}^n (3 + 3 + 1 + \sum_{i=0}^n (6 + 4) + 6)$$

$$= 10n^2 + 18n - 4$$

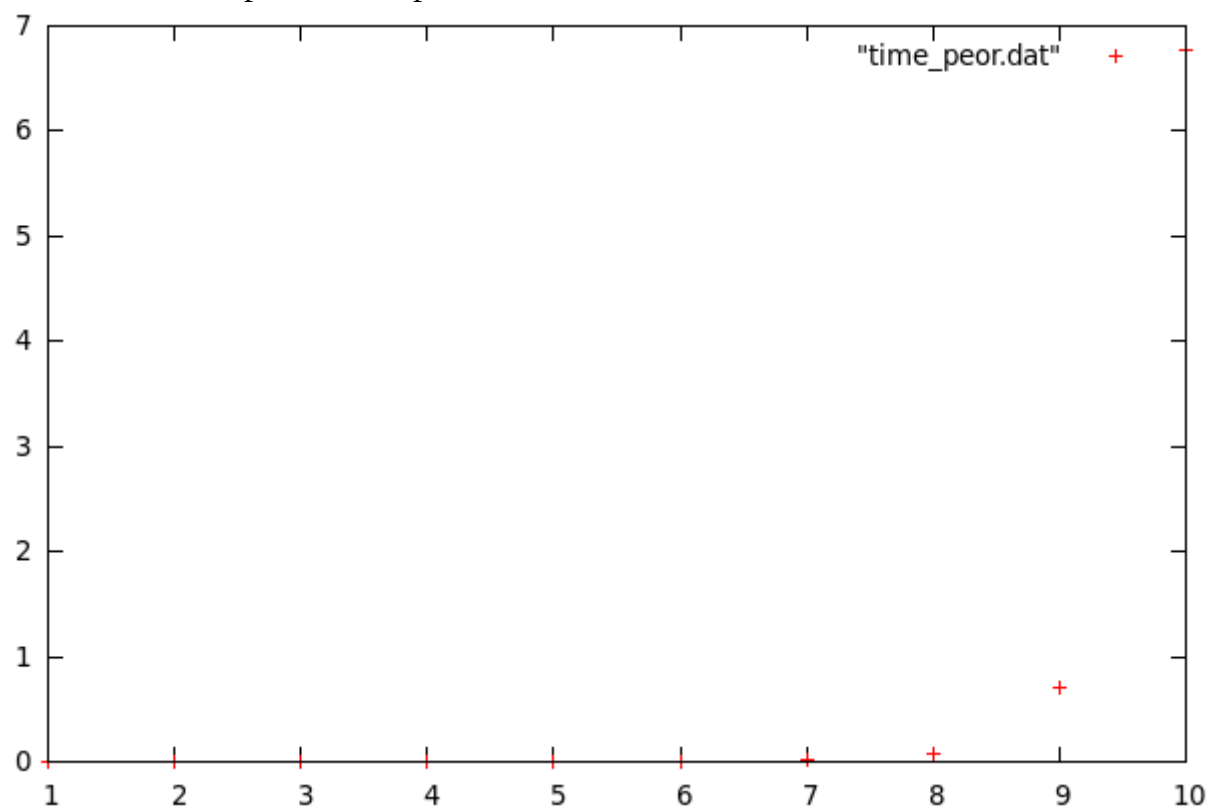
$$f(x) = 10x^2 + 18x - 4$$

plot f(x)



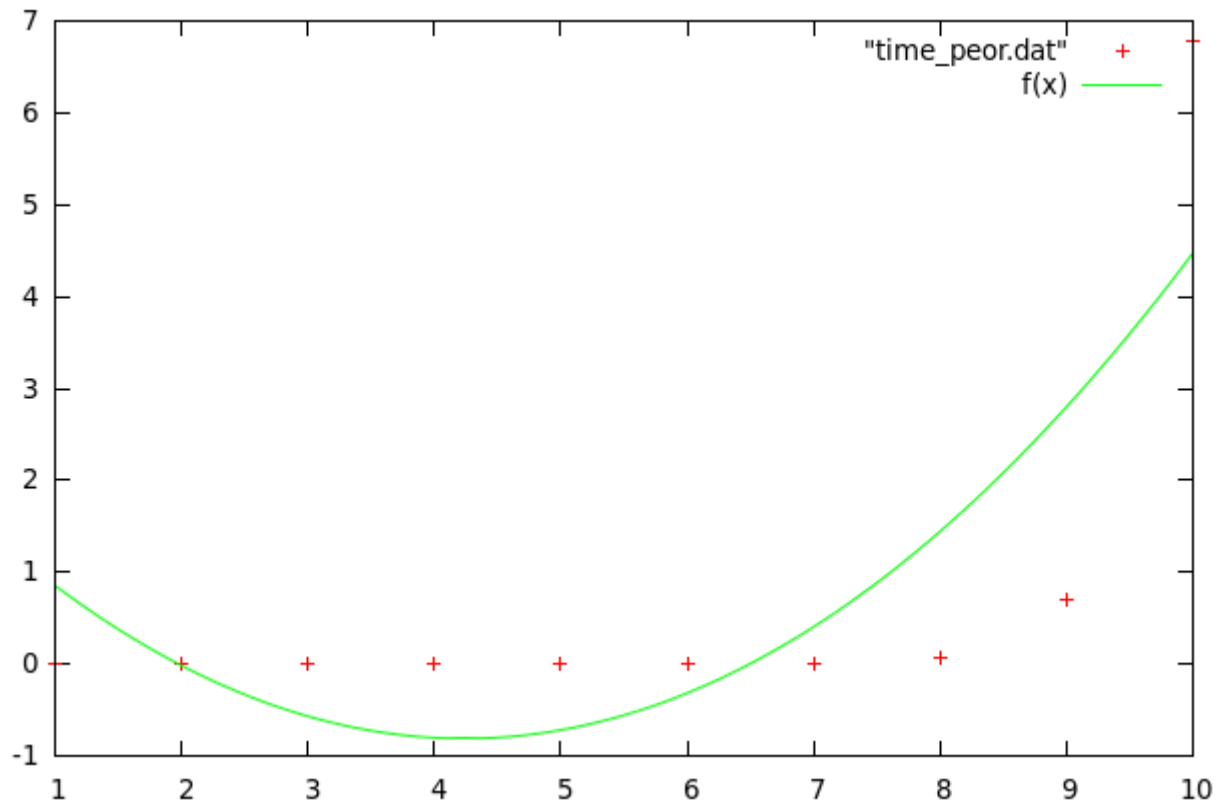
- Eficiencia empírica:

plot "time\_peor.dat"



- Ajuste:

$f(x) = a \cdot x^2 + b \cdot x - c$   
 fit  $f(x)$  "time\_peor.dat" via a, b, c  
 plot "time\_peor.dat",  $f(x)$

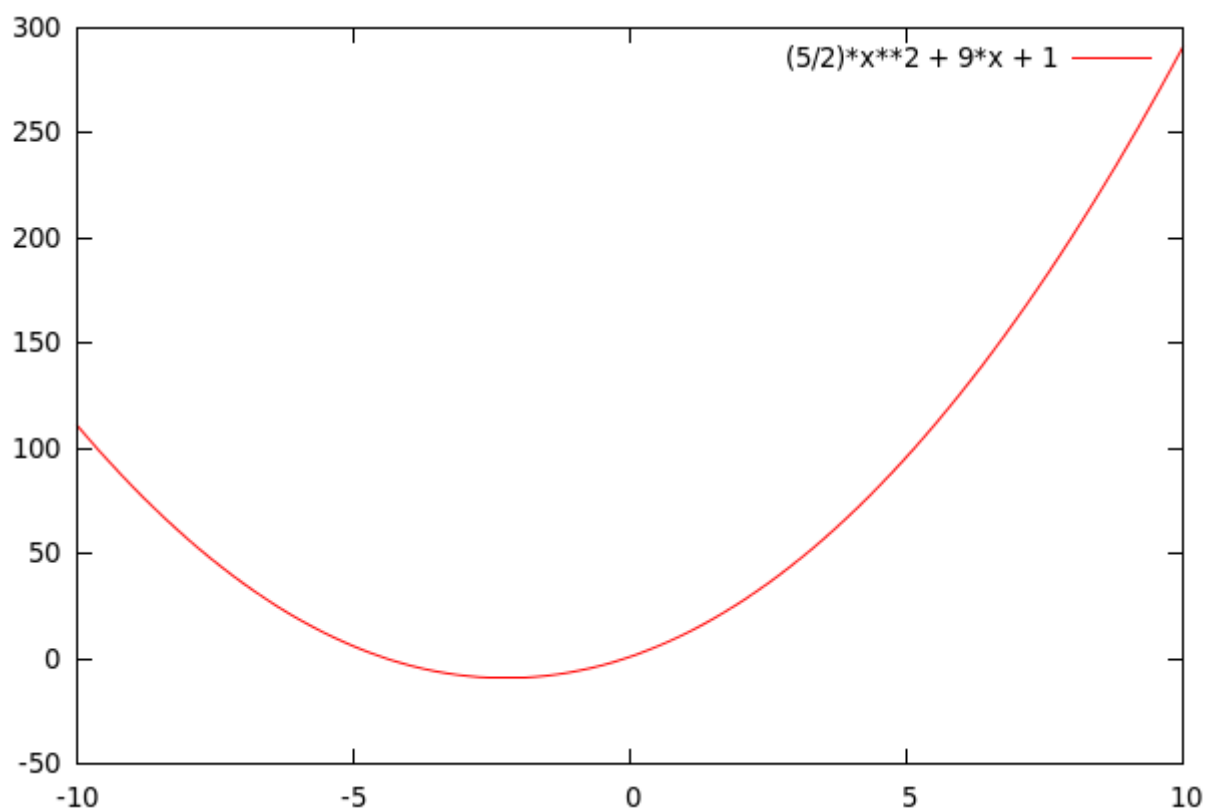


c) Caso Promedio:

- Eficiencia Teórica:

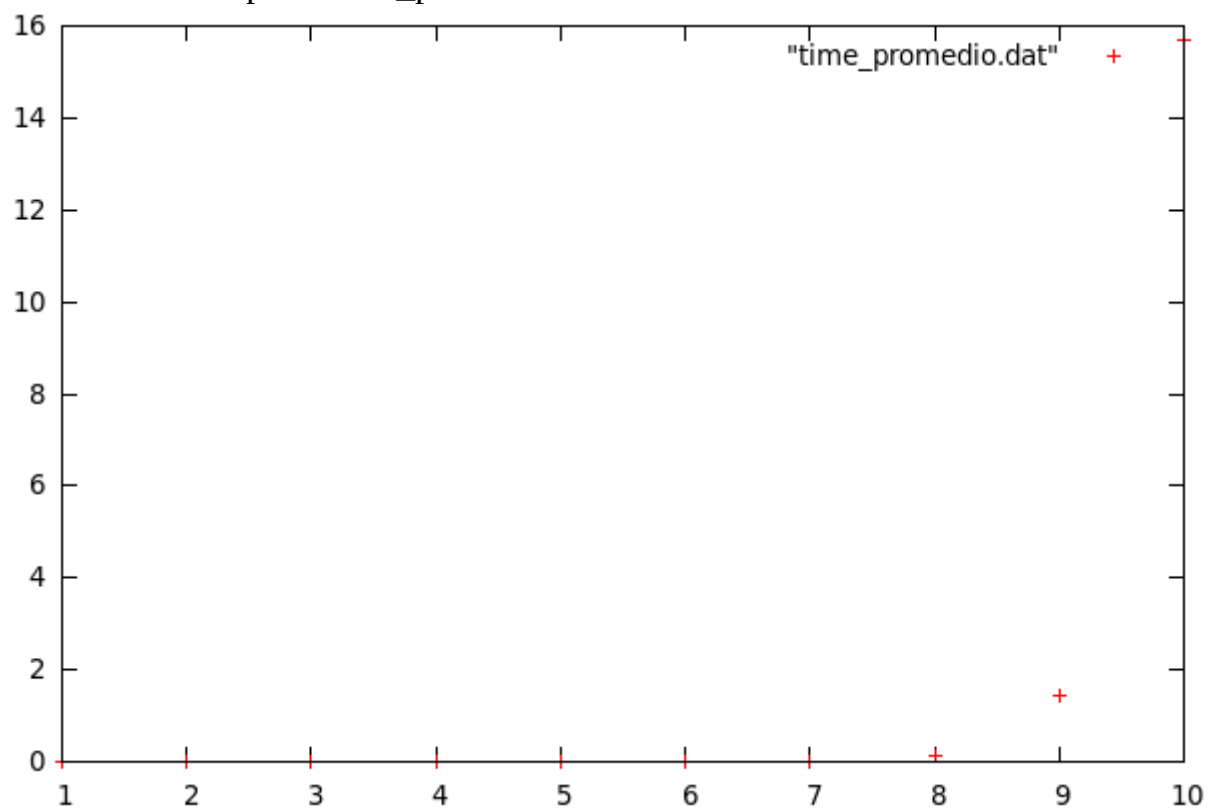
$$\begin{aligned}
 T_{1/2}(n) &= 3 + \sum_{i=0}^{(n-2)/2} (5) + 3 + \sum_{i=0}^{n/2} (3 + 3 + 1 + \sum_{i=0}^{n/2} (10) + 6) \\
 &= (5/2)n^2 + 9n + 1
 \end{aligned}$$

$f(x) = (5/2) \cdot x^2 + 9 \cdot x + 1$   
 plot  $f(x)$



- Eficiencia empírica:

plot "time\_promedio.dat"



- Ajuste:

```
f(x) = a*x**2 + b*x + c  
fit f(x) "time_promedio.dat" via a, b, c  
plot "time_promedio.dat", f(x)
```



