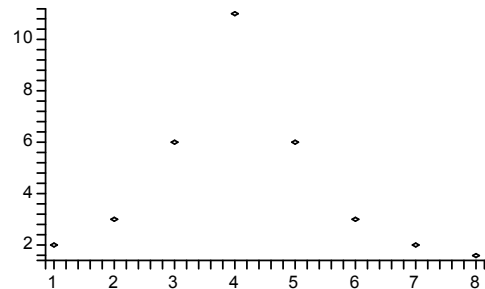


```
> restart;
with(plots):
with(LinearAlgebra):
Warning, the name changecoords has been redefined
```

```
> ndata:=8;
f1:=t->subs({a1=1,a2=10,a3=1,a4=4},a1+a2/(a3+(t-a4)^2));
T:=seq(f1(i),i=1..ndata);
f1 := t -> subs({a1 = 1, a2 = 10, a4 = 4, a3 = 1}, a1 +  $\frac{a2}{a3 + (t - a4)^2}$ )
```

```
> listplot(T,connect=false);
l1:=listplot(T,connect=false):
```



```
> f:=t->a1+a2/(a3+(t-a4)^2);
nparam:=4:
```

$$f := t \rightarrow a1 + \frac{a2}{a3 + (t - a4)^2}$$

```
> for i from 1 to nparam do
dfda| i:=unapply(diff(f(x),a| |i),x);
end do;
```

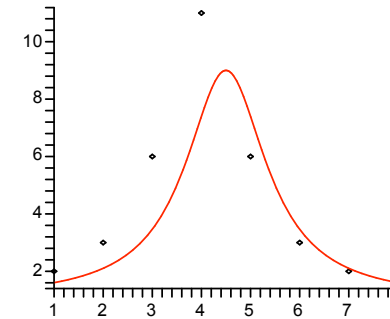
$$\begin{aligned} dfda1 &:= x \rightarrow 1 \\ dfda2 &:= x \rightarrow \frac{1}{a3 + (x - a4)^2} \\ dfda3 &:= x \rightarrow -\frac{a2}{(a3 + (x - a4)^2)^2} \\ dfda4 &:= x \rightarrow -\frac{a2(-2x + 2a4)}{(a3 + (x - a4)^2)^2} \end{aligned}$$

```
> g1:=Vector([1,8,1,4.5]):
```

```
> guess1:={};
for i from 1 to nparam do
guess1:={op(guess1),a| |i=g1[i]};
```

```
end do:
guess1;
{a2 = 8, a4 = 4.5, a1 = 1, a3 = 1}
```

```
> p1:=plot(subs(guess1,f(x)),x=1..ndata):
display(l1,p1);
```



```
> df:=Vector([seq(subs(guess1,T[i]-f(i)),i=1..ndata)]):
```

```
> Jac:=Matrix(ndata,nparam);
for i from 1 to ndata do
for j from 1 to nparam do
Jac[i,j]:=evalf(subs(guess1,dfda| |j(i)));
end do:
end do:
```

```
> tJac:=(MatrixInverse(Transpose(Jac).Jac)).Transpose(Jac):
```

```
> g2:=tJac.df;
g1:=g1+g2:
```

$$g2 := \begin{bmatrix} -0.234892945717938922 \\ 5.59192512234087946 \\ 0.612746490420997047 \\ -0.519508338876065844 \end{bmatrix}$$

```
>
>
```