This is a least squares problem example.

```
> X := [1,2,3,4];
```

$$X := [1, 2, 3, 4]$$

```
> Y := [1,3,3,5];
```

$$Y := [1, 3, 3, 5]$$

The LeastSquares command in the CurveFitting package does a least-squares fit for us

```
> CurveFitting[LeastSquares](X,Y,x);
```

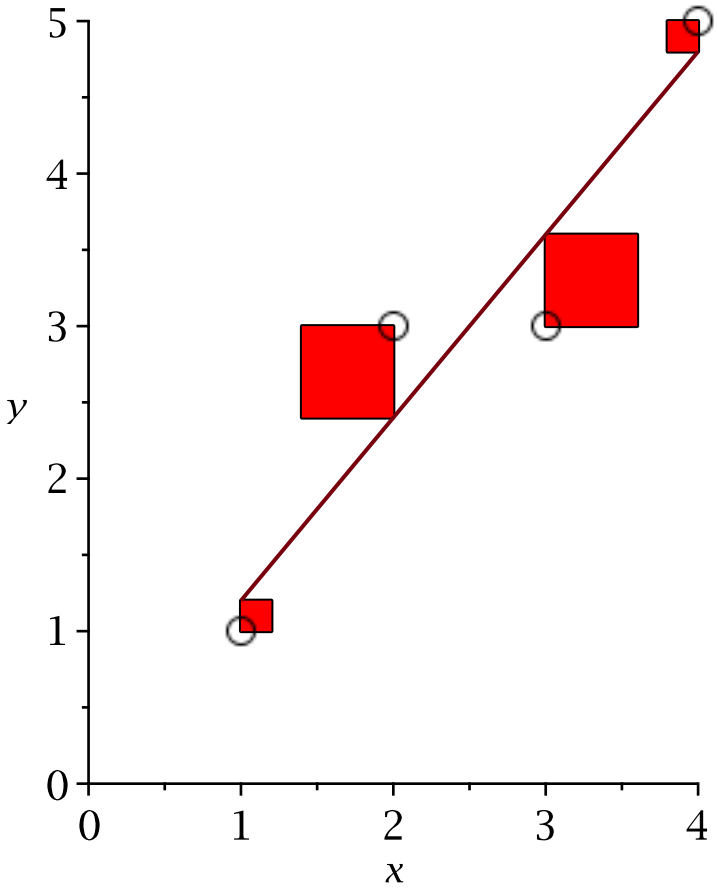
$$\frac{6}{5} x$$

```
> with(Student);
```

[*Basics*, *Calculus1*, *LinearAlgebra*, *MultivariateCalculus*, *NumericalAnalysis*, *Precalculus*, *SetColors*, *SetDefault*, *SetDefaults*, *Statistics*, *VectorCalculus*]

The LeastSquaresPlot command in the Student[LinearAlgebra] package generates a nice plot for us.

```
> with(LinearAlgebra):
> LeastSquaresPlot( X,Y,[x,y],boxoptions=[color=red],
                    pointoptions=[symbolsize=20], view=[0..4,0..5]
  ) ;
```

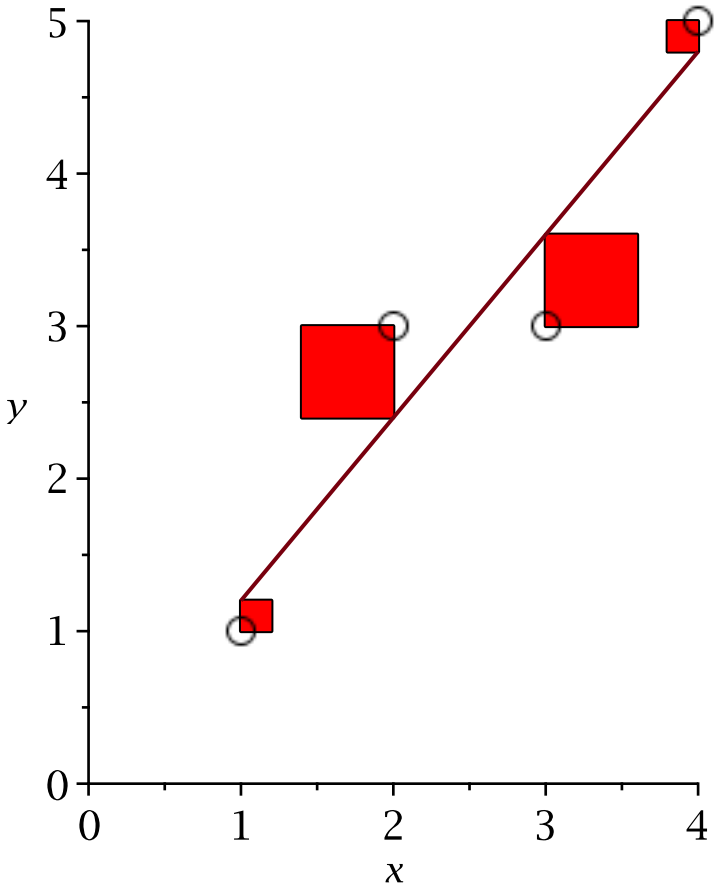


Least–squares fit of the curve $y = a\,x + b$ to 4 given data points.

```
> infolevel[Student[LinearAlgebra]] := 1;
```

$$infolevel_{Student:-LinearAlgebra} := 1$$

```
> LeastSquaresPlot( X,Y,[x,y],boxoptions=[color=red],
                    pointoptions=[symbolsize=20], view=[0..4,0..5]
  ) ;
Fitting curve: .7e-13+1.200*x
Least squares error: .8944
Maximum error: .6000
```



Least–squares fit of the curve $y = a\,x + b$ to 4 given data points.

If $E(m, b)$ is the least squares error then we can solve the equations for the critical point $E_m(m, b) = 0$ and $E_b(m, b) = 0$.

```
> X;
```

$$[1, 2, 3, 4]$$

```
> Y;
```

$$[1, 3, 3, 5]$$

```
> n := 4;
```

$$n := 4$$

```
> eqn1 := add(X[i]^2,i=1..n)*m + add(X[i],i=1..n)*b = add(X[i]*Y
  [i],i=1..n);
  eqn2 := add(X[i],i=1..n)*m + n*b = add(Y[i],i=1..n);
```

$$eqn1 := 30\,m + 10\,b = 36$$

$$eqn2 := 10\,m + 4\,b = 12$$

```
> solve( {eqn1,eqn2} );
```

$$\left\{b = 0,\ m = \frac{6}{5}\right\}$$