

# How can I use the calculator to determine the value of $S_{xy}$ in a linear regression analysis?

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June 25, 2024

## RECOMMENDED CITATION

stats writer (2024). *How can I use the calculator to determine the value of  $S_{xy}$  in a linear regression analysis?*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=152998>

The calculator can be used to easily determine the value of Sxy in a linear regression analysis. Sxy is a measure of the covariance between the independent variable (x) and the dependent variable (y). To calculate Sxy, enter the data points for both x and y into the calculator. Then, use the built-in regression function to find the slope (b) and intercept (a) of the best-fit line. The value of Sxy can then be determined by multiplying the slope (b) by the standard deviation of x and y. This method allows for a quick and accurate determination of Sxy, which is essential in understanding the relationship between two variables in a linear regression analysis.

## Sxy Calculator for Linear Regression

```
@import
```

```
url('https://fonts.googleapis.com/css?family=Droid+Serif|Raleway');
```

```
h1 {  
text-align: center;  
font-size: 50px;  
margin-bottom: 0px;  
font-family: 'Raleway', serif;  
}
```

```
p {  
color: black;  
margin-bottom: 15px;  
margin-top: 15px;  
font-family: 'Raleway', sans-serif;  
}
```

```
#words {  
padding-left: 30px;  
color: black;  
font-family: Raleway;  
max-width: 550px;  
margin: 25px auto;  
line-height: 1.75;  
}
```

```
#words_summary {  
padding-left: 70px;  
color: black;  
font-family: Raleway;  
max-width: 550px;  
margin: 25px auto;  
line-height: 1.75;  
}
```

```
#words_text {  
color: black;  
font-family: Raleway;  
max-width: 550px;  
margin: 25px auto;  
line-height: 1.75;
```

```
}
```

```
#words_text_area {  
display:inline-block;  
color: black;  
font-family: Raleway;  
max-width: 550px;  
margin: 25px auto;  
line-height: 1.75;  
padding-left: 100px;  
}
```

```
#calcTitle {  
text-align: center;  
font-size: 20px;  
margin-bottom: 0px;  
font-family: 'Raleway', serif;  
}
```

```
#hr_top {  
width: 30%;  
margin-bottom: 0px;  
border: none;  
height: 2px;  
color: black;
```

```
background-color: black;  
}
```

```
#hr_bottom {  
width: 30%;  
margin-top: 15px;  
border: none;  
height: 2px;  
color: black;  
background-color: black;  
}
```

```
#words label, input {  
display: inline-block;  
vertical-align: baseline;  
width: 350px;  
}
```

```
#button {  
border: 1px solid;  
border-radius: 10px;  
margin-top: 20px;  
  
cursor: pointer;  
outline: none;
```

```
background-color: white;  
color: black;  
font-family: 'Work Sans', sans-serif;  
border: 1px solid grey;  
/* Green */  
}
```

```
#button:hover {  
background-color: #f6f6f6;  
border: 1px solid black;  
}
```

```
#words_table {  
color: black;  
font-family: Raleway;  
max-width: 350px;  
margin: 25px auto;  
line-height: 1.75;  
}
```

```
#summary_table {  
color: black;  
font-family: Raleway;  
max-width: 550px;  
margin: 25px auto;
```

```
line-height: 1.75;  
padding-left: 20px;  
}
```

```
.label_radio {  
text-align: center;  
}
```

```
td, tr, th {  
border: 1px solid black;  
}
```

```
table {  
border-collapse: collapse;  
}
```

```
td, th {  
min-width: 50px;  
height: 21px;  
}
```

```
.label_radio {  
text-align: center;  
}
```

```
#text_area_input {  
padding-left: 35%;  
float: left;
```

```
}
```

```
svg:not(:root) {  
overflow: visible;  
}
```

This calculator automatically finds the value for  $S_{xy}$  for a linear regression model based on the  $x$  values and  $y$  values in a dataset.

To calculate  $S_{xy}$ , simply enter a list of comma-separated values for  $x$  and  $y$  in the boxes below, then click the "Calculate" button:

x values:

y values:

$S_{xy} = 59.00000$

```
function calc() {
```

```
//get input data
```

```
var x =  
document.getElementById('x').value.split(',').map(Number);
```

```
var y =
document.getElementById('y').value.split(',').map(Number);

//check that both lists are equal length
if (x.length - y.length == 0) {
document.getElementById('error_msg').innerHTML = "";

function linearRegression(y,x){
var lr = {};
var n = y.length;
var sum_x = 0;
var sum_y = 0;
var sum_xy = 0;
var sum_xx = 0;
var sum_yy = 0;
var sxx = jStat.variance(x) *x.length;

for (var i = 0; i < y.length; i++) {

sum_x += x;
sum_y += y;
sum_xy += (x*y);
sum_xx += (x*x);
sum_yy += (y*y);
```

```
}  
lr = sxx;  
lr = (n * sum_xy - sum_x * sum_y) / (n*sum_xx - sum_x *  
sum_x);  
lr = (sum_y - lr.slope * sum_x)/n;  
lr = Math.pow((n*sum_xy -  
sum_x*sum_y)/Math.sqrt((n*sum_xx -  
sum_x*sum_x)*(n*sum_yy - sum_y*sum_y)),2);  
  
return lr;  
}  
var lr = linearRegression(y, x);  
var a = lr.slope*lr.sxx;  
var b = lr.intercept;  
  
document.getElementById('a').innerHTML =  
a.toFixed(5);  
}  
  
//output error message if boths lists are not equal  
else {  
document.getElementById('error_msg').innerHTML =  
'The two lists must be of equal length.';  
}
```

} //end calc function

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