

ME 1020 Engineering Programming with MATLAB

Problem 6.11:

11.* The number of twists y required to break a certain rod is a function of the percentage x_1 and x_2 of each of two alloying elements present in the rod. The following table gives some pertinent data. Use linear multiple regression to obtain a model $y = a_0 + a_1x_1 + a_2x_2$ of the relationship between the number of twists and the alloy percentages. In addition, find the maximum percent error in the predictions.

Number of twists y	Percentage of element 1 x_1	Percentage of element 2 x_2
40	1	1
51	2	1
65	3	1
72	4	1
38	1	2
46	2	2
53	3	2
67	4	2
31	1	3
39	2	3
48	3	3
56	4	3

```
% Problem 6.11
clear
clc
disp('Problem 6.11: Scott Thomas')

format shortEng

x1 = [1 2 3 4 1 2 3 4 1 2 3 4]';
x2 = [1 1 1 1 2 2 2 2 3 3 3 3]';
y = [40 51 65 72 38 46 53 67 31 39 48 56]';

X = [ones(size(x1)), x1, x2];
a = X\y
yp = X*a;
Max_Percent_Error = 100*max(abs((yp - y)./y))
```

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a =

```
40.0000e+000
 9.6000e+000
-6.7500e+000
```

Max_Percent_Error =

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7.1250e+000
```