**Statement of Problem**

Suppose you experiment with two different shoes and two different balls to determine the best combination for scoring the highest in bowling. Below is the data. Can you come to some conclusion as to what may be the best combination? One possible answer is there is no conclusion.

**Summary of solution**

To find the best combination of shoe and ball, I first took the average of the scoreswith the same combination. For each combination we were given two scores. After I had the mean, I then found the standard deviation of matching shoe and ball combinations. Once I had the mean and standard deviation of each shoe and ball combination, I plotted the distribution and compared all four combinations. The plot can be seen in section next section. From the plot it can be seen that the best combination is with the shoes A2 and ball B2, which from now on will be referred to as A2B2. However, I do not really believe that it is possible to come to a conclusion with only two scores for each combination. It is possible that the scores provided for the combination A2B2 would just be outliers if we were to collect a much larger data set. So assuming the data isa true representation of a larger data set than I would say A2B2 is the best combination;however, with only two data points I do not believe that a conclusion can be drawn.

**Computer Code and Output**

**Code:**

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%%Mathematical Modeling Assignment 1

%%Problem 4

A1B1 = [176 , 180];

A1B2 = [176 , 182];

A2B1 = [186 , 182];

A2B2 = [184 , 188];

% Mean

mu\_A1B1 = (A1B1(1,1)+A1B1(1,2))/2;

mu\_A1B2 = (A1B2(1,1)+A1B2(1,2))/2;

mu\_A2B1 = (A2B1(1,1)+A2B1(1,2))/2;

mu\_A2B2 = (A2B2(1,1)+A2B2(1,2))/2;

%Standard Dev

std\_dev\_A1B1 = std(A1B1);

std\_dev\_A1B2 = std(A1B2);

std\_dev\_A2B1 = std(A2B1);

std\_dev\_A2B2 = std(A2B2);

x\_A1B1 = -25+mu\_A1B1:.01:25+mu\_A1B1;

y\_A1B1 = (std\_dev\_A1B1\*sqrt(2\*pi))^-1\*exp(-.5\*((x\_A1B1-mu\_A1B1)/std\_dev\_A1B1).^2);

x\_A1B2 = -25+mu\_A1B2:.01:25+mu\_A1B2;

y\_A1B2 = (std\_dev\_A1B2\*sqrt(2\*pi))^-1\*exp(-.5\*((x\_A1B2-mu\_A1B2)/std\_dev\_A1B2).^2);

x\_A2B1 = -25+mu\_A2B1:.01:25+mu\_A2B1;

y\_A2B1 = (std\_dev\_A2B1\*sqrt(2\*pi))^-1\*exp(-.5\*((x\_A2B1-mu\_A2B1)/std\_dev\_A2B1).^2);

x\_A2B2 = -25+mu\_A2B2:.01:25+mu\_A2B2;

y\_A2B2 = (std\_dev\_A2B2\*sqrt(2\*pi))^-1\*exp(-.5\*((x\_A2B2-mu\_A2B2)/std\_dev\_A2B2).^2);

% Create figure

figure1 = figure;

% Create axes

axes1 = axes('Parent',figure1);

box(axes1,'on');

hold(axes1,'all');

% Create plot

plot(x\_A1B1,y\_A1B1,'Parent',axes1,'LineWidth',2,'Color',[1 0 0],...

'DisplayName','A1 B1');

% Create plot

plot(x\_A1B2,y\_A1B2,'Parent',axes1,'LineWidth',2,...

'Color',[0.501960784313725 0.501960784313725 0.501960784313725],...

'DisplayName','A1 B2');

% Create plot

plot(x\_A2B1,y\_A1B1,'Parent',axes1,'LineWidth',2,'Color',[0 0 1],...

'DisplayName','A2 B1');

% Create plot

plot(x\_A2B2,y\_A1B1,'Parent',axes1,'LineWidth',2,'DisplayName','A2 B2',...

'Color',[0 0 0]);

% Create xlabel

xlabel({'Mean'});

% Create ylabel

ylabel({'std dev'});

% Create title

title({'Distribution of Shoe/Ball Combinaions'});

% Create legend

legend1 = legend(axes1,'show');

set(legend1,...

'Position',[0.799652777777777 0.763726249088668 0.0770833333333333 0.120751988430947]);

% Create textarrow

annotation(figure1,'textarrow',[0.6 0.552604166666667],...

[0.767672199170125 0.711618257261411],'TextEdgeColor','none',...

'String',{'mu = 186','sigma = 2.8284'});

% Create textarrow

annotation(figure1,'textarrow',[0.558854166666667 0.5234375],...

[0.822651452282158 0.780082987551867],'TextEdgeColor','none',...

'String',{'mu = 184','sigma = 2.8284'});

% Create textarrow

annotation(figure1,'textarrow',[0.367708333333333 0.426041666666667],...

[0.854809128630705 0.814315352697095],'TextEdgeColor','none',...

'String',{'mu = 178','sigma = 2.8284'});

% Create textarrow

annotation(figure1,'textarrow',[0.3453125 0.433854166666667],...

[0.635929460580913 0.569502074688797],'TextEdgeColor','none',...

'String',{'mu = 179','sigma = 4.2426'});

**Plot**

