Feedback — Week4A (Basic)
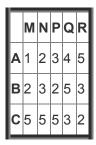
You submitted this quiz on **Wed 25 Feb 2015 2:28 PM PST**. You got a score of **2.00** out of **2.00**.

Question 1

Here is a table of 1-5 star ratings for five movies (M, N, P. Q. R) by three raters (A, B, C).

	M	N	P	Q	R
A	1	2	3	4	5
B	2	3	2	5	3
C	5	5	5	3	2

Normalize the ratings by subtracting the average for each row and then subtracting the average for each column in the resulting table. Then, identify the true statement about the normalized table.

Your Answer		Score	Explanation
○ The largest element is (B,Q).			
○ The entry (B,N) is -1/3.			
● The smallest element is (C,R).	✔	1.00	
○ The largest element is (C,M).			
Total		1.00 / 1.00	

Question Explanation

When we subtract the average for each row from the entries in that column, we get:

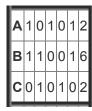|	M	N	P	Q	R
A	-2	-1	0	1	2
B	-1	0	-1	2	0
C	1	1	1	-1	-2

For instance, the average of the row for A is 3, so 3 is subtracted from each entry in the first row. The average in row C is 4, so we subtract 4 from each entry in the bottom row. Then, in the table above, we average each column and subtract the average from the entries in that column, getting:

	M	N	P	Q	R
A	-4/3	-1	0	1/3	2
B	-1/3	0	-1	4/3	0
C	5/3	1	1	-5/3	-2

For instance, the average of the first column is -2/3, so we add 2/3 to each of the entries in the first column.

Question 2

Below is a table giving the profile of three items.

A	1	0	1	0	1	2
B	1	1	0	0	1	6
C	0	1	0	1	0	2

The first five attributes are Boolean, and the last is an integer "rating." Assume that the scale factor for the rating is α. Compute, as a function of α, the cosine distances between each pair of profiles. For each of α = 0, 0.5, 1, and 2, determine the cosine of the angle between each pair of vectors. Which of the following is FALSE?

Your Answer		Score	Explanation
⦿ For α = 1, A is closer to B than C is.	✔	1.00	
◯ For α = 0, B is closer to A than C is.			
◯ For α = 0, B is closer to C than A is.			
◯ For α = 2, C is closer to B than A is.			
Total		1.00 / 1.00	

Question Explanation

First, we must compute the dot products of the three pairs of vectors.
$A.B = 2 + 12\alpha^2$
$A.C = 4\alpha^2$
$B.C = 1 + 12\alpha^2$

Next, compute the lengths of the vectors:

$|A| = sqrt(3 + 4\alpha^2)$
$|B| = sqrt(3 + 36\alpha^2)$
$|C| = sqrt(2 + 4\alpha^2)$

From these, we can compute the cosines of the angles between each pair of vectors:

$cos(A,B) = (2 + 12\alpha^2)/sqrt(9 + 120\alpha^2 + 144\alpha^4)$
$cos(A,C) = (4\alpha^2)/sqrt(6 + 20\alpha^2 + 16\alpha^4)$

$cos(B,C) = (1 + 12\alpha^2)/sqrt(6 + 84\alpha^2 + 144\alpha^4)$

The approximate values of these cosines for the four values of α mentioned are:

	α = 0	α = 0.5	α = 1	α = 2
cos(A,B)	.67	.72	.8473	.9461
cos(A,C)	0	.08	.62	.87
cos(B,C)	.41	.67	.8498	.9526