Group 17

Continuous Assessment 1

LBNSTE002, AZRRAP001, RKHRIT001

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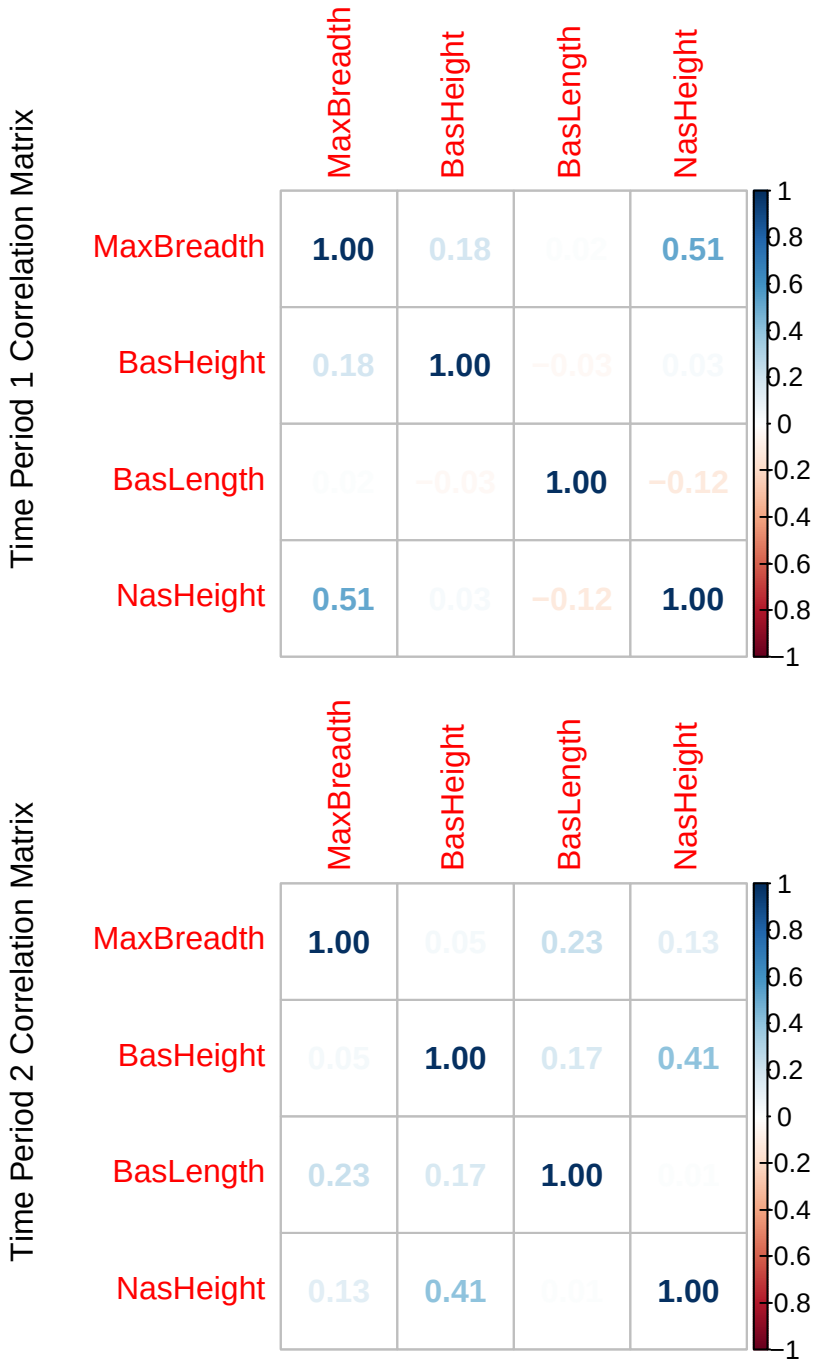
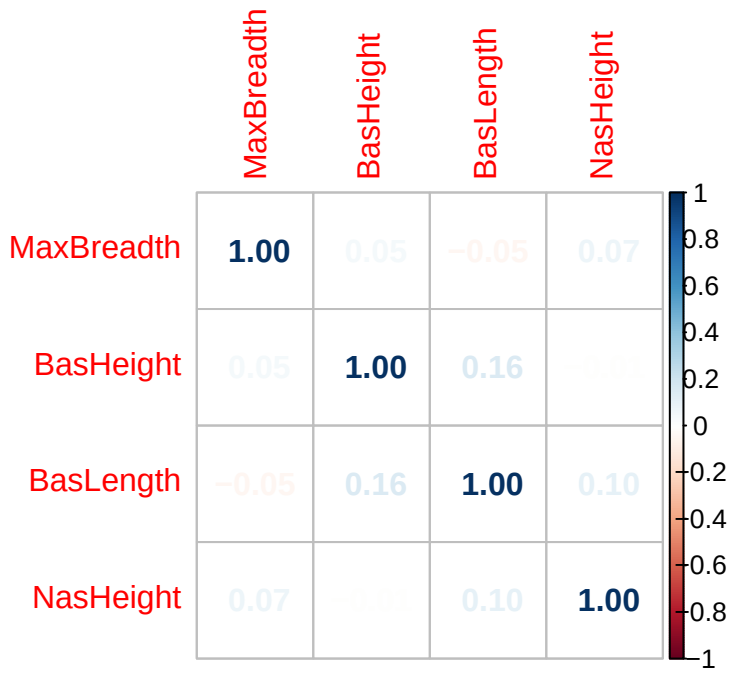
Question 1:

```
# A tibble: 5 x 5
  TimePeriod MaxBreadth BasHeight BasLength NasHeight
       <int>      <dbl>     <dbl>     <dbl>     <dbl>
1          1       131.      134.      99.2      50.5
2          2       132.      133.      99.1      50.2
3          3       134.      134.      96.0      50.6
4          4       136.      132.      94.5      52.0
5          5       136.      130.      93.5      51.4
```

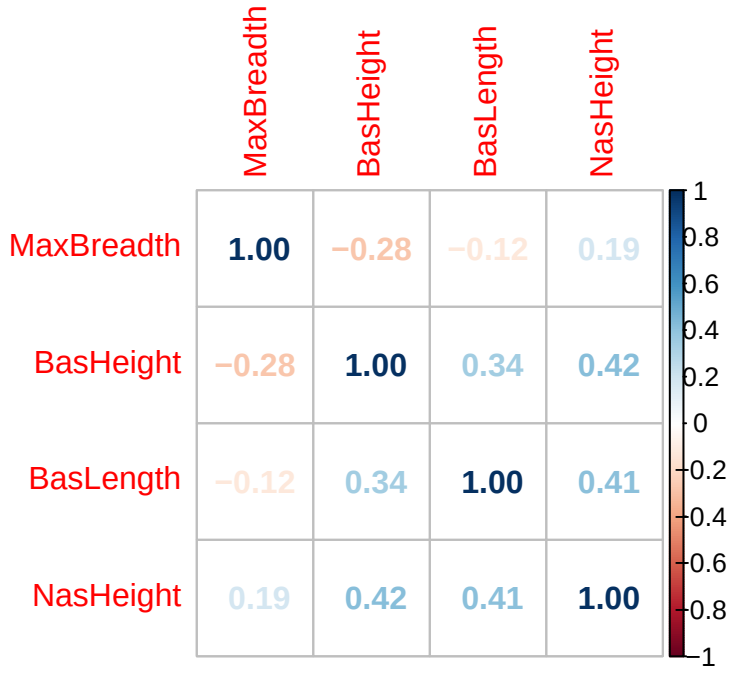
Question 2:

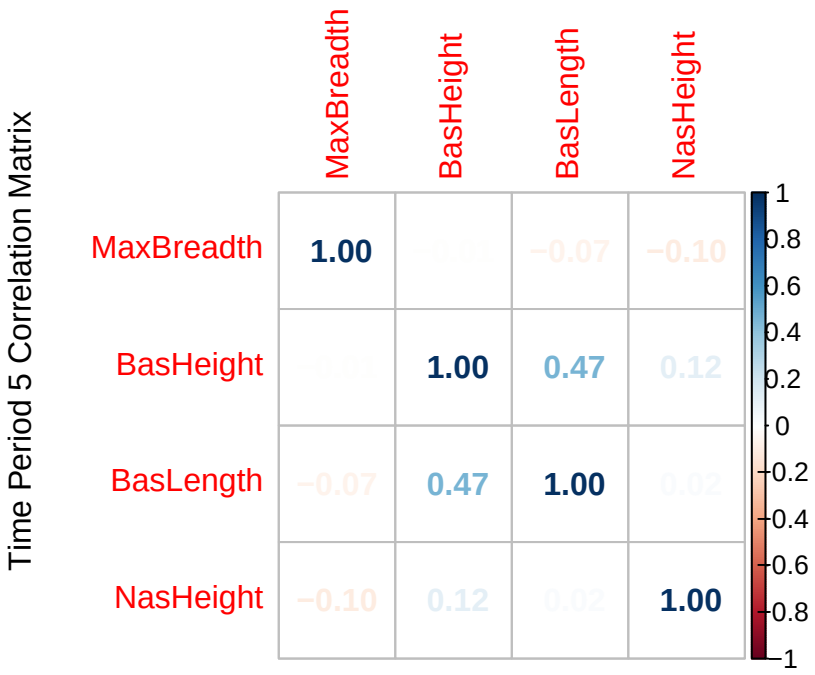

Time Period 1 Correlation Matrix
MaxBreadth
BasHeight
BasLength
NasHeight
1.00
0.18
0.02
0.51
0.18
1.00
−0.03
0.03
0.02
−0.03
1.00
−0.12
0.51
0.03
−0.12
1.00
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
Time Period 2 Correlation Matrix
MaxBreadth
BasHeight
BasLength
NasHeight
1.00
0.05
0.23
0.13
0.05
1.00
0.17
0.41
0.23
0.17
1.00
0.01
0.13
0.41
0.01
1.00
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1

Time Period 3 Correlation Matrix



Time Period 4 Correlation Matrix





Over time, the correlation between Maximal Breadth (X1) and Basialveolar Length (X3) weakened, indicating a shift in skull proportions. The relationship between Basibregmatic Height (X2) and Nasal Height (X4) strengthened in later periods, suggesting structural changes. Additionally, some previously positive correlations turned negative, particularly between Basibregmatic Height (X2) and Maximal Breadth (X1) in later periods, showing evolving skull shape patterns.

Question 3:

```
[1] "Angle between deviation vectors: 89.1380954556786 degrees"
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```
[1] "Angle between deviation vectors: 1.55575325465859 radians"
```

The angle between the deviation vectors for MaxBreadth (X1) and BasLength (X3) in Period 1 is approximately 89.14, which is close to 90. This is expected because the correlation coefficient between these two variables in Period 1, as seen in the correlation matrix, is close to zero. A near-zero correlation indicates that the two variables are largely uncorrelated, meaning their deviation vectors are almost orthogonal, leading to an angle close to 90.

Question 4

```
# A tibble: 5 x 2
  TimePeriod Y_mean
       <int>  <dbl>
1          1   20.2
2          2   18.3
3          3   17.2
4          4   20.4
5          5   17.9
```

```
           [,1]      [,2]      [,3]       [,4]        [,5]
[1,] 51.5643678  1.402299  23.32299  -7.924138   0.2229885
[2,]  1.4022989 90.712644  -6.08046  29.862069   2.8850575
[3,] 23.3229885 -6.080460 120.11609 -10.131034 -33.4321839
[4,] -7.9241379 29.862069 -10.13103  74.731034  14.6482759
[5,]  0.2229885  2.885057 -33.43218  14.648276 165.0298851
```