

**Homework Assignment 3 - 10 Points**  
**Due at beginning of class, Thursday, 10 February 2011**

There are two parts to this homework assignment. Each part counts 5 points. Late homework will receive a grade of zero. Your homework must be typed, not handwritten. Graphs must be prepared with computer software, not hand-drawn.

**Part 1:**

Susan Schiffman investigated the relationships among 12 odorants by asking subjects to rate how similar pairs of the odorants were to each other. She computed a 2D multidimensional scaling solution from the similarity judgments (odorants judged similar to each other are close together; those judged dissimilar are far apart). The dimension 1 and dimension 2 coordinates of the 2D scaling solution for the 12 odorants are given in the table below.

| "Odorant"      | "Dim_1" | "Dim_2" | "Weight" | "Shape" | "Hedonic" |
|----------------|---------|---------|----------|---------|-----------|
| "Camphor"      | -0.788  | 3.89    | 9.919    | 3.662   | 6.03      |
| "Cinnamon"     | -2.98   | 1.645   | 19.97    | 1.538   | 8.276     |
| "Clove"        | -2.266  | 4.517   | 12.39    | 3.032   | 7.265     |
| "Eucalyptus"   | -3.719  | 1.671   | 4.289    | 3.49    | 8.338     |
| "Feces"        | 3.227   | 2.611   | 6.348    | 4.761   | 1.678     |
| "Lemon"        | -1.675  | -1.227  | 15.53    | 4.484   | 6.775     |
| "Menthol"      | -1.059  | 1.932   | 6.354    | 2.818   | 6.257     |
| "Rotten_Eggs"  | 3.99    | -3.577  | 6.544    | 1.121   | 1.15      |
| "Turpentine"   | -0.788  | -3.812  | 5.424    | 4.45    | 6.261     |
| "Sweaty_Socks" | 2.143   | 0.339   | 18.99    | 3.559   | 2.764     |
| "Vanilla"      | -4.212  | -0.47   | 14.53    | 4.965   | 9.417     |
| "Vinegar"      | 2.069   | -0.313  | 4.432    | 2.175   | 3.456     |

Make a square graph of the points in the 2D space. Set the limits of the x and y axes to range from c(-5,5). Label each of the points with the corresponding odorant name. (hint: use the text() command in R to add text to a graph). This graph is easily done by putting the data columns into vectors using c() and making a script of the R-code. Ask for help.

**Part 2:**

To help interpret the meaning of dimensions 1 and 2, three additional characteristics of the odorants are given above: the relative weight of the molecule (Weight), the shape of the molecule (Shape) and the rated pleasantness of the odor (Hedonic) on a scale from 0 (very unpleasant) to 10 (very pleasant). Do either dimensions 1 or 2 correspond to any of these three qualities? Explain your conclusion.