

## The New Fly Problem

In the early 1990's, two new varieties of a large biting fly were discovered by biologists in the jungles of Guatemala. The biologists found that one of the flies, which in the field they called the **Ax** fly, was a carrier of disease, while the other, called the **Aa** fly, was quite harmless (the names were later changed once the biologists were able to determine the appropriate genus). In an effort to distinguish the two varieties when captured in the field, the biologists took simple measurements on the flies they caught. The easiest measurements were the wing length, the abdomen length, and antennae length (all measured in centimeters).

Aa Biting Fly										
<b>Wing Length (cm)</b>	2.10	3.31	3.83	3.11	1.65	1.73	1.84	2.49	2.53	2.99
<b>Abdomen Length (cm)</b>	1.72	1.94	1.74	1.70	1.82	1.83	1.90	1.82	1.88	1.87
<b>Antenna Length (cm)</b>	1.34	1.58	1.64	1.45	1.38	1.48	1.49	1.54	1.56	1.65

Ax Biting Fly							
<b>Wing Length (cm)</b>	2.87	4.02	3.18	3.51	3.74	3.95	3.28
<b>Abdomen Length (cm)</b>	1.78	1.86	1.96	2.00	2.10	1.96	1.87
<b>Antenna Length (cm)</b>	1.14	1.29	1.30	1.26	1.39	1.28	1.28

- 1) Find a simple way using the of wing, abdomen, and antenna measurements to distinguish an **Aa** from an **Ax** fly. *Pay special attention to considering how to test your model and assess its sensitivity.*
- 2) Create 100 of each fly variety based on the information you have on their physical characteristics. How many of these pseudo-flies does your procedure correctly distinguish?
- 3) *After creating your procedure for distinguishing the two varieties* apply your method to classify three new specimens with (Wing Length, Abdomen Length, Antenna Length, Max Antenna Width) of
  - i) (2.81, 1.80, 1.24)
  - ii) (2.65, 1.84, 1.28)
  - iii) (3.61, 2.04, 1.40).