

- **Question:** The principle objective of many data collection exercises in forestry is developing models that predict the volume and general value of trees in a forested tract. Volume is approximated using the formula: $Volume = \pi r^2 * Height$, where r is half the Mean Diameter at Breast Height (MDBH). Breast height is defined as 4.5 feet above ground. While cruising a stand of trees it is fairly easy to estimate the number of trees per acre and the height of the trees. Information on the age of the stand can be obtained from planting records. It is time consuming to collect data on the MDBH and so it is desirable to have a model for predicting the MDBH for a stand of trees.
- **Data Collection:** For stands of pine trees the following characteristics are measured or counted:
 - Mean Height of Pine trees (MHP) in feet.
 - Number of Pine trees (NoP) per acre.
 - Age of Pine trees (AGE) in years.
 - Mean Diameter at Breast Height (MDBH) in inches. Breast height is defined as 4.5 feet above ground.

Foresters sometimes use variables derived from these basic measurements as their explanatory variables. In particular:

- $X_1 = MHP$
- $X_2 = AGE * NoP$
- $X_3 = MHP / NoP$

- **Data:**

X_1	X_2	X_3	MDBH
51.5	9500	0.10300	7.0
41.3	12600	0.04589	5.0
36.7	7150	0.05646	6.2
32.2	6240	0.06708	5.2
39.0	6760	0.07500	6.2
29.8	7320	0.04885	5.2
51.2	12600	0.07314	6.2
46.8	10640	0.06158	6.4
61.8	18600	0.06645	6.4
55.8	11730	0.08087	6.4
37.3	10400	0.04662	5.4
54.2	13650	0.08338	6.4
32.5	5830	0.06132	5.4
56.3	12920	0.08279	6.7
52.8	10540	0.08516	6.7
47.0	13500	0.05222	5.9
53.0	9920	0.08548	6.9
50.3	11680	0.06890	6.9
50.5	9520	0.07426	6.9
57.7	10560	0.12021	7.9