1. The normal model for the error: the errors are normally distributed, independent, with mean 0, and a constant standard deviation $\sigma$.

2. The model has a number of parameters.

3. We construct estimates, confidence intervals, and hypothesis tests for the parameters.

4. Example: simplest example (no explanatory variable)

$$y = \mu + \varepsilon$$

5. Example: The linear model:

$$y = \alpha + \beta_1 x_1 + \cdots + \beta_k x_k + \varepsilon$$

**Homework**

1. Read Devore and Farnum, pages 488-490, 501-503
\begin{verbatim}
> l = lm(stack.loss ~ Air.Flow + Water.Temp + Acid.Conc., data = stackloss)
> l

Call:
  lm(formula = stack.loss ~ Air.Flow + Water.Temp + Acid.Conc., data = stackloss)

Coefficients:
         -39.9197      0.7156      1.2953    -0.1521

> summary(l)

Call:
  lm(formula = stack.loss ~ Air.Flow + Water.Temp + Acid.Conc., data = stackloss)

Residuals:
     Min      1Q  Median      3Q     Max
-7.2377 -1.7117 -0.4551  2.3614  5.6978

Coefficients:
                           Estimate Std. Error t value Pr(>|t|)
(Intercept)                -39.9197    11.8960  -3.356  0.00375 **
Air.Flow                   0.7156      0.1349   5.307  5.8e-05 ***
Water.Temp                 1.2953      0.3680   3.520  0.00263 **
Acid.Conc.                -0.1521      0.1563  -0.973  0.34405

---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1 1

Residual standard error: 3.243 on 17 degrees of freedom
Multiple R-squared: 0.9136, Adjusted R-squared: 0.8983
F-statistic: 59.9 on 3 and 17 DF, p-value: 3.016e-09

> anova(l)

Analysis of Variance Table

Response: stack.loss
            Df Sum Sq Mean Sq  F value Pr(>F)
Air.Flow    1 1750.1 1750.12 336.3707 3.309e-10 ***
Water.Temp  1  130.3  130.32   25.6886  0.00263 **
Acid.Conc.  1    9.9    9.97   0.1964  0.66460
Residuals 17 178.8  10.52
\end{verbatim}