4.1

(a)+(b) measures weight and is therefore not a Bernoulli trial.

(c) Since it consist of tests on several parts it is not one but several Bernoulli trials. Hence it is a binomial trial. (p. 164)

(d) Is a Bernoulli trial with the probability $p = 0.85$.

4.3

The possible outcomes are:
$\{[HHH], [HHT], [HTH], [THH], [HTT], [THT], [TTH], [TTT]\}$
As each outcome has the probability $p = \frac{1}{8}$ the theoretical probabilities are:

(a) $\frac{1}{8} \cdot 3 = \frac{3}{8}$

(b) $\frac{7}{8}$

(c) $\frac{2}{8} = \frac{1}{4}$

4.8

If A and B are disjoint they must satisfy $P(A \cup B) = P(A) + P(B) \leq 1$. Since $P(A) + P(B) = 1.4$ they are not disjoint.

4.59

We use X to denote the number of girls. The distribution of girls must satisfy the following: $X \in b(1500, 0.5) \sim N(750, 375)$.

Using the normal approximation stated om p. 198 we wish to calculate $P(X \geq 900) = P(X \geq 899.5) = P\left(Z \geq \frac{899.5-(1500)(0.5)}{\sqrt{(1500)(0.5)(0.5)}}\right) = 0.0000$, where $Z \in N(0, 1)$.

The conclusion is that it is not likely that $p = 0.5$, i.e. that boys and girls are not equally likely to be born.

4.64

Since the figure is right skewed it is most sensible to try a $Y = \ln(X)$ or a $Y = \sqrt{X}$ transformation. See p. 208.

4.67

First we write the mean; $\bar{Y}_n = \frac{1}{n}\sum_{i=1}^{n} Y_i$. Using equation (4.10) on p. 160 we get that $V(\frac{1}{n}\sum_{i=1}^{n} Y_i) = \frac{1}{n^2}V(\sum_{i=1}^{n} Y_i)$. Now using (4.15) we get $V(\sum_{i=1}^{n} Y_i) = n\sigma_{Y_i}^2$. Inserting this above yields:

$$\sigma_{\bar{Y}_n}^2 = \frac{1}{n^2} n\sigma_{Y_i}^2 = \frac{\sigma_{Y_i}^2}{n}$$

The square root of this shows the second problem.