Larsen and Marx 2.5: Independence

These notes reflect material from our text, *Introduction to Mathematical Statistics and Its Applications, Fifth Edition*, by Richard J. Larsen and Morris L. Marx, Pearson, ISBN 978-0-321-69394-5, 2012.

Independence

Definition 1 *Two events A and B defined over the sample space S are* independent *if*

$$P(A \cap B) = P(A) \cdot P(B).$$

Definition 2 *The events $A_1, A_2, \ldots, A_n$ defined over the sample space S are* independent *if for every set of indices $i_1, i_2, \ldots, i_k$ with $1 \leq i_1, i_2, \ldots, i_k \leq n$,*

$$P(A_{i_1} \cap A_{i_2} \cap \cdots \cap A_{i_k}) = P(A_{i_1}) \cdot P(A_{i_2}) \cdots P(A_{i_k}).$$

Theorem 1 *(Stirling's Formula)*

$$n! \doteq \sqrt{2\pi}\, n^{n+1/2} e^{-n}.$$

A convenient way to use Stirling's Formula is to first calculate the ln of the right-hand side, and then exponentiate.

Exercises from Larsen and Marx, Section 2.5: 1, 5, 7, 9, 15, 16, 17

To hand in for homework:

Homework exercises from Larsen and Marx, Section 2.5: 7, 9, 16, 17