Probability and Statistics for Final Year Engineering Students

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Starred Exercises 0: Mathematical Review

Starred Exercises:

- Find a formula for the number of ways to distribute k identical balls into n distinct boxes. Example, if k=3 and n = 2 the number of ways is 4.
- 2) Assume the sets $A_1, ..., A_M$ have each a finite number of elements, $|A_i| = n_i$. Find a formula based on $n_1, ..., n_M$ for the number of elements in the set $B = A_1 \cup ... \cup A_M$. Note that the formula should take into account that the sets are not necessarily disjoint.
- 3) Let $f(x) = e^{-\frac{x^2}{2}}$. Show that $\int_{-\infty}^{\infty} f(x)dx = \sqrt{2\pi}$. Hint: Look at the function g(x, y) = f(x)f(y) and integrate it over the plane after making a change to polar coordinates.