

group for every prime divisor of its order every subgroup of G has the same property. In particular, if the symmetric group of degree n involves Sylow subgroups for every prime which divides its order, then every substitution group of degree n (and hence every group of finite order) must involve at least one Sylow subgroup for every prime which divides its order. It is very easy to prove, as Cauchy observed, that every symmetric group of degree n has the given property, and hence the theorem which was proved above as a slight extension of one due to Cauchy implies that every group of finite order involves at least one Sylow subgroup for every prime divisor of its order. As this is the main element in Sylow's theorem it is clear that Cauchy used a method which required only slight changes to yield an easy proof of the fundamental theorem known as Sylow's theorem. It would evidently be necessary only to prove that every symmetric group whose degree is a power of p involves Sylow subgroups of order p^m in order to establish the existence of Sylow subgroups in every group of finite order by means of the theorem proved above.

The preceding remarks may also serve to exhibit additional reasons for regarding Sylow's theorem as merely an extension of Cauchy's fundamental theorem, which established the fact that every group whose order is divisible by the prime p involves operators of order p . In fact, if Cauchy had used a general value of ρ instead of $\rho = 1$ in the theorem proved above, he would have arrived at Sylow's theorem by the same steps as those which led him to his fundamental theorem. The oversight of this slight increase in generality retarded Sylow's theorem nearly thirty years and made Jordan's *Traité des Substitutions* much more difficult reading.

EXISTENCE THEOREMS FOR CERTAIN UNSYMMETRIC KERNELS.

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IN this paper is given a brief account of the existence and expansion theorems for certain integral equations with unsymmetric kernels. Full details of the method involved and a discussion of a less general integral equation are contained in an article, "Biorthogonal systems of functions with applica-