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There is an extensive literature of monic polynomials and binary forms with given discriminant. The first part of our paper gives a brief survey of the most important results over $\mathbb{Z}$ on such polynomials and binary forms as well as on their various applications. In the second part we improve some earlier general effective and quantitative results over number fields. As an application we obtain some new information about the arithmetical properties of discriminants of polynomials and binary forms.

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