Simultaneous additive equations: 
Repeated and differing degrees
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Abstract. We obtain bounds for the number of variables required to establish Hasse principles, both for existence of solutions and for asymptotic formulæ, for systems of additive equations containing forms of differing degree but also multiple forms of like degree. Apart from the very general estimates of Schmidt and Browning–Heath-Brown, which give weak results when specialized to the diagonal situation, this is the first result on such “hybrid" systems. We also obtain specialised results for systems of quadratic and cubic forms, where we are able to take advantage of some of the stronger methods available in that setting. In particular, we achieve essentially square root cancellation for systems consisting of one cubic and \( r \) quadratic equations.