

1. Solve exercise 23.E.5 in Mas-Colell, Whinston and Green [MWG].
2. Solve exercise 23.F.2 in MWG.
3. Solve exercise 23.F.3 in MWG. (The “general case” means that agents might have different distribution functions, but that any such function has increasing virtual valuations.)
4. Consider a seller which has a single indivisible good for sale which she values by  $x_0$ . Suppose she auctions this good to  $N$  potential buyers in a second price auction with reserve price. Buyers are ex ante symmetric, and buyer  $i$  has a value  $\theta_i \in [0, \bar{\theta}]$  for the good, where  $\theta$  is independently distributed according to distribution function  $F$  with density  $f$ .

Show directly that the revenue-maximizing reserve price is independent of  $N$  (i.e., do not solve for the optimal auction, but derive directly the optimal reserve price for a second price auction). (Hint: Determine in a first step the ex-ante expected payment made by buyer  $i$  as a function of the reserve price.)

5. Solve exercise 13.D.2 in MWG.