

**MATHEMATICAL AND BASIC CONCEPTS**

$\Delta x, \Delta f(x)$	change in value of $x$ , change in value of $f(x)$
$f'(x), f''(x)$	first, second derivative of single-variable function $f(x)$
$\partial f(x_1, \dots, x_n) / \partial x_i$ or $f_i(x_1, \dots, x_n)$	partial derivatives of multivariate function $f(x_1, \dots, x_n)$
$\varepsilon_{y,x}$ or $E_{y,x}$	elasticity of $y$ with respect to $x$
$\alpha$	generic parameter in an optimization problem
$x^*(\alpha), x_1^*(\alpha), \dots, x_n^*(\alpha)$	solutions function(s) to a general optimization problem
$\phi(\alpha)$	optimal value function for a general optimization problem
$\lambda$	Lagrange multiplier
$P$	generic price for supply-demand diagram
$Q$	generic quantity for supply-demand diagram
$S, D$	supply and demand for supply-demand diagram

**CONSUMPTION AND DEMAND**

$x_i$	consumption level of commodity $i$
$(x_1, \dots, x_n)$	consumption bundle
$\succsim, \succ, \sim$	weak preference, strict preference and indifference
$U(x_1, \dots, x_n)$	utility function
$MU_i(x_1, \dots, x_n)$ or $U_i(x_1, \dots, x_n)$	marginal utility of commodity $i$
$MRS_{ij}(x_1, \dots, x_n)$	marginal rate of substitution between commodities $i$ and $j$
$p_i$	price of commodity $i$
$I$	consumer's income
$x_i^*(p_1, \dots, p_n, I)$	ordinary ("Marshallian") demand function
$V(p_1, \dots, p_n, I)$	indirect utility function
$x_i^c(p_1, \dots, p_n, \bar{u})$	compensated ("Hicksian") demand function
$E(p_1, \dots, p_n, \bar{u})$	expenditure function
$EV, CV$	equivalent variation, compensating variation
$L_e$	consumer's leisure
$L_a$	consumer's labor supply

$I_0$	consumer's nonlabor income
$w$	wage rate
$i$ or $r$	interest rate
$c_t$	consumption in period $t$
$M_t$	income in period $t$
$s_t$	saving in period $t$

### **PRODUCTION AND COST**

$L$	labor input
$K$	capital input
$q$ or $Q$	output
$f(L,K)$ or $F(L,K)$	production function
$MP_L(L,K)$ , $MP_K(L,K)$	marginal product of labor, marginal product of capital
$AP_L(L,K)$ , $AP_K(L,K)$	average product of labor, average product of capital
$MRTS(L,K)$	marginal rate of technical substitution
$w$	wage rate
$r$	rental rate on capital
$c(\cdot)$ or $C(\cdot)$	generic cost function
$LTC(q,w,r)$	long run total cost function
$LMC(q,w,r)$	long run marginal cost function
$LAC(q,w,r)$	long run average cost function
$\bar{K}$	fixed capital
$STC(q,w,r,\bar{K})$	short run total cost function
$SFC = r \cdot \bar{K}$	short run fixed cost
$SVC(q,w,\bar{K})$	short run variable cost function
$SMC(q,w,\bar{K})$	short run marginal cost function
$SATC(q,w,r,\bar{K})$	short run average total cost function
$SAVC(q,w,\bar{K})$	short run average variable cost function
$SAFC = r \cdot \bar{K}/q$	short run average fixed cost

## **PROFIT MAXIMIZATION AND SUPPLY**

$s^{LR}$	long run individual commodity supply
$s^{SR}$	short run individual commodity supply
$q^*$	generic optimal quantity supplied
$MVP_L = P \cdot MP_L(L, K)$	value of the marginal product of labor
$MVP_K = P \cdot MP_K(L, K)$	value of the marginal product of capital
$R = P \cdot q$	revenue
$\pi$	profit

## **MARKETS AND WELFARE ANALYSIS**

$t, s$	tax rate, subsidy rate
$p_c, p_f$	price to consumer under a tax, price to firm under a tax
$g_i, G$	individual's provision, total provision of a public good
$E_i$	total endowment of commodity $i$ for Edgeworth Box
$e_i^j$	consumer $j$ 's endowment of commodity $i$
$x_i^j$	consumer $j$ 's final consumption of commodity $i$
$CS, PS, SS$	consumer surplus, producer surplus, social surplus
$DWL$	deadweight loss
$PMC, SMC$	private marginal cost, social marginal cost
$PMB, SMB$	private marginal benefit, social marginal benefit

## **GAME THEORY**

$s, s_i, s_{-i}$	strategy profile, strategy profile of player $i$ , of other players
$S_i, S$	player $i$ 's strategy space, space of strategy profiles
$u_i$	player $i$ 's payoff function
$UD_i$	player $i$ 's undominated strategies
$R$	rationalizable strategy profiles