Econ 101 Midterm Cheat Sheet

Present Value: $PV = \frac{FV}{(1+i)^n}$, Present Value of a Stream: $PV = \sum_{t=1}^{n} \frac{FV_t}{(1+i)^t}$, $PV_{firm} = \pi_0(\frac{1+i}{i-g})$ when FV grows at rate g

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elasticity: $E_{G,S} = \frac{\%\Delta G}{\%\Delta S}$ e.g., own price elasticity of demand: $E_{Q_x,P_x} = \frac{\%\Delta Q_x^d}{\%\Delta P_x} = \frac{\delta Q_x^d}{\delta P_x}\frac{P_x}{Q_x} = \frac{\delta ln Q_x^d}{\delta ln P_x}$

$lnQ_x^d = \beta_0 + \beta_x lnP_x + \beta_y lnP_y + \beta_M lnM + \beta_H lnH$ is log linear demand function, which has

own price elasticity: $E_{Q_x,P_x} = \beta_x$ cross-price elasticity: $E_{Q_x,P_y} = \beta_y$ and income elasticity: $E_{Q_x,M} = \beta_M$

Dorfman-Steiner formula: $\frac{A}{R} = \frac{E_{Q,A}}{-E_{Q,P}}$

Budget set: $P_x X + P_y Y \leq M$

Marginal product of labor: $MP_L = \frac{\Delta Q}{\Delta L}$ Marginal product of capital: $MP_K = \frac{\Delta Q}{\Delta K}$

Marginal rate of technical substitution: $MRTS_{KL} = \frac{MP_L}{MP_K}$ Cost-minimizing input rule: $\frac{MP_L}{MP_K} = \frac{w}{r}$

The multiproduct cost function: $C(Q_1, Q_2) = f + aQ_1Q_2 + (Q_1)^2 + (Q_2)^2$ has economies of scope exist when $C(Q_1, 0) + C(0, Q_2) > C(Q_1, Q_2)$ and economies of scale when ATC is decreasing in Q_i

A learning curve exists when average costs decline as output increases. Usually this appears as a term $-b\,lnZ$,where Z is the sum of all quantities produced since the item first began production.

$C_4 = \frac{S_1+S_2+S_3+S_4}{S_T}$, HHI: $HHI = 10,000 \sum w_i^2$, Rothschild index: $R = \frac{E_T}{E_F}$, Lerner Index: $L = \frac{P-MC}{P}$

Markup factor: $\frac{1}{1-L}$

Perfect Competition: many buyers and sellers; homogenous products; max profits when $MC = MR = P$

Short Run Decisions	Long Run Decisions
if Loss < FC, continue to operate	P = MC or P = min AC
if P < AVC, shutdown	zero economic profits
if P $\geq$ $min\ AVC$, continue to operate	

Monopoly: single firm in the market; has price power; can be due to economies or scale or scope (maybe complementarity) or learning curve (natural) or government rules (unnatural); max profits when $MR = MC$ where $MR = P \times \frac{(1+E)}{E}\ for\ E < -1$.

Multi-plant monopoly: where $Q = Q_1 + Q_2$ $MR(Q_1 + Q_2) = MC_1(Q_1)$ $MR(Q_1 + Q_2) = MC_2(Q_2)$

Monopolistic Competition: many buyers and sellers with differentiated products; free entry and exit; in LR, zero economic profit; max profits = MR = MC; in the LR, P > MC and P = ATC > min. average costs

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Sweezy model: firm believes that rivals will match price reduction but not price increases; max profit MR=MC

Cournot Oligopoly: *Formula for Marginal Revenue:* If the (inverse) market demand in a Cournot duopoly is $P = a - b(Q_1 + Q_2)$ where a and b are positive constants, and cost functions are $C_1(Q_1) = c_1Q_1$ and $C_2(Q_2) = c_2Q_2$, then reaction functions are $Q_1 = r_1(Q_2) = \frac{a-c_1}{2b} - \frac{1}{2}Q_2$ and $Q_2 = r_2(Q_1) = \frac{a-c_2}{2b} - \frac{1}{2}Q_1$

Stackelberg Oligopoly: firms set output sequentially; leader set output, leader chooses $Q_1 = \frac{a+c_2-2c_1}{2b}$ because followers will react as Cournot $Q_2 = r_2(Q_1)$

Bertrand model with homogenous goods: MC is constant; each firm sets price; in NE, $P_1 = P_2 = MC$ so economic profits are zero.

Bertrand model with differentiated goods: $P > MC$

Contestable markets: price is driven down to the second lowest AC, due to free entry.

Game Theory: 1. look for dominant strategies / 2. put yourself in your rival's shoes / 3. at the Nash equilibrium, every player is best responding to other players. The Nash equilibrium is a strategy profile in which no player can improve her payoff by unilaterally changing her own strategy, given the other player's strategies. Sustaining cooperative outcomes with trigger strategies: $\frac{\pi^{cheat} - \pi^{coop}}{\pi^{coop} - \pi^{N}} \leq \frac{1}{i}$.