FORMULA SHEET

Microeconomics

Allocative Efficiency Condition

P = MC, or more precisely,
Marginal Social Benefit (MSB) = Marginal Social Cost (MSC)

Average Fixed Cost

$$\text{AFC} = \frac{\text{Total Fixed Cost (TFC)}}{\text{Quantity of Output (Q)}}$$

Average Product

$$\text{AP} = \frac{\text{Total Product}}{\text{Quantity of Input}}$$

Average Profit

$$\text{Average Profit} = \frac{\text{Total Profit}}{\text{Quantity}}$$

Average Revenue

$$\text{Average Revenue} = \frac{\text{Total Revenue}}{\text{Quantity}}$$

Average Total Cost

$$\text{ATC} = \frac{\text{Total Cost (TC)}}{\text{Quantity of Output (Q)}}$$

Average Variable Cost

$$\text{AVC} = \frac{\text{Total Variable Cost (TC)}}{\text{Quantity of Output (Q)}}$$

Cross-Price Elasticity of Demand

$$\frac{\text{Percentage Change in Quantity Demanded of Good X}}{\text{Percentage Change in Price of Good Y}}$$

Distributive Efficiency Condition

$$\frac{MU_F}{P_F} = \frac{MU_C}{P_C}$$

Elasticity of Supply

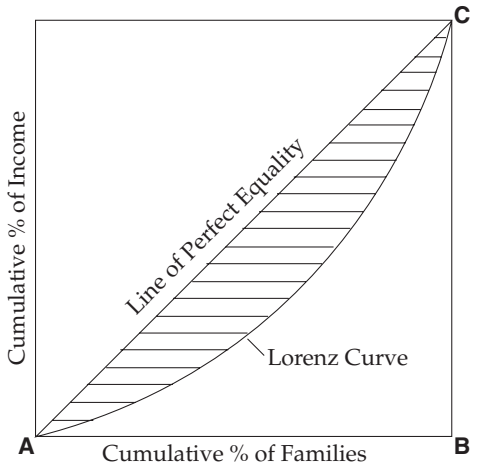
$$\frac{\text{Percentage Change in Quantity Supplied}}{\text{Percentage Change in Price}}$$

(Use the point or arc formula as indicated below for the price elasticity of demand, substituting the quantity supplied for the quantity demanded.)

Factor of Production Hiring Rule: Hire Until

MRP = MFC (in other books, MFC is sometimes called MRC)

Gini Coefficient



$$\frac{\text{shaded area}}{\text{area of triangle ABC}}$$

Marginal Cost

$$MC = \frac{\Delta TC}{\Delta Q} = \frac{\Delta TVC}{\Delta Q}$$

Marginal Product of Labor

$$MP_L = \frac{\Delta TP}{\Delta L}$$

Marginal Revenue

$$MR = \frac{\Delta TR}{\Delta Q}$$

Marginal Revenue Product of Labor (MRP_L)

$$MRP_L = MP_L \times MR_{output}$$

Optimal Combination of Resources Condition

$$\frac{MP_L}{w} = \frac{MP_K}{r}$$

Optimal Consumption Rule

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$$

Price Elasticity of Demand

Simple "Point" Formula

$$\frac{\%\Delta Q_d}{\%\Delta P} = \frac{\frac{\Delta Q_d}{Q}}{\frac{\Delta P}{P}} = \frac{\frac{Q_{new} - Q_{old}}{Q_{old}}}{\frac{P_{new} - P_{old}}{P_{old}}}$$

More Precise "Arc" Formula

$$\frac{\frac{Q_{new} - Q_{old}}{\left(\frac{Q_{new} + Q_{old}}{2}\right)}}{\frac{P_{new} + P_{old}}{\left(\frac{P_{new} + P_{old}}{2}\right)}}$$

Price for a Competitive Firm

$$P = MR = AR$$

Production Efficiency Condition

$$\frac{w}{r} = \frac{MP_L}{MP_K} \text{ or } \frac{MP_K}{r} = \frac{MP_L}{w} \text{ orp} = \min ATC$$

Profit

$$\text{Profit} = TR - TC$$

Profit-Maximizing Output Level (if output should be produced at all), rule for finding

$$MR = MC$$

Slope

$$\frac{\text{Rise}}{\text{Run}}$$

Slope of the Total Product Curve

$$\frac{\text{Rise}}{\text{Run}} = \frac{\text{Change in Total Product}}{\text{Change in the Number of Units of an Input}} = \text{Marginal Product}$$

Socially Optimal Level of Output

$$MSB = MSC$$

Total Costs

$$\text{Total Costs} = \text{Total Fixed Costs} + \text{Total Variable Costs, } TC = TFC + TVC$$

MACROECONOMICS

Aggregate Expenditure in a Simple Model Without Government or Foreign Sectors

$$AE = C + I$$

Allocative Efficiency Condition

P = MC, or more precisely,
Marginal Social Benefit (MSB) = Marginal Social Cost (MSC)

Autonomous Spending Multiplier

$$\text{Multiplier} = \frac{1}{1 - \text{MPC}} = \frac{1}{\text{MPS}}$$

Balanced Budget Multiplier

$$\text{Balanced Budget Multiplier} = \frac{1}{1 - \text{MPC}} + \left(\frac{-\text{MPC}}{1 - \text{MPC}}\right) = \frac{1 - \text{MPC}}{1 - \text{MPC}} = 1$$

Bank's Reserve Ratio

$$\text{Reserve Ratio} = \frac{\text{Bank Reserves}}{\text{Total Deposits}}$$

Budget Deficit

Budget Deficit = Federal Government Spending – Tax Collections
(A negative deficit indicates a surplus.)

Financial Account Balance

Financial Account Balance =
Foreign Purchases of Home Assets – Home Purchases of Foreign Assets

Consumer Price Index

$$\text{CPI} = \frac{\text{Base Year Quantities} \times \text{Current Year Prices}}{\text{Base Year Quantities} \times \text{Base Year Prices}} \times 100$$

Consumption Function

$$C = C_a + MPC(Y)$$

Current-Account Balance

Current-Account Balance =
Trade Balance + Services Balance + Unilateral

Distributive Efficiency Condition

$$\frac{MU_F}{P_F} = \frac{MU_C}{P_C}$$

Equality of Leakages and Injections

$$S + T + M = I + G + X$$

Equation of Exchange

$$MV = PQ$$

Gross Domestic Product

$$GDP = C + I + G + (X - M)$$

GDP = NI + Depreciation + Indirect Taxes – Subsidies + Net Income of Foreigners

Gross Domestic Product Deflator

$$\text{GDP Deflator} = \frac{\text{Current Year Quantities} \times \text{Current Year Prices}}{\text{Current Year Quantities} \times \text{Base Year Prices}} \times 100$$

Income in a Simple Model Without Government or Foreign Sectors

$$Y = C + S$$

Inflation Between Two Years

$$\text{Inflation Between Years Y and Z} = \left[\frac{\text{CPI in Year Z}}{\text{CPI in Year Y}} - 1\right] \times 100$$

Marginal Propensity to Consume

$$\text{MPC} = \frac{\text{Change in Consumption}}{\text{Change in Income}}$$

Marginal Propensity to Save

$$\text{MPS} = \frac{\text{Change in Saving}}{\text{Change in Income}}$$

Marginal Propensity to Save and Marginal Propensity to Consume Sum

$$\text{MPC} + \text{MPS} = 1$$

Merchandise Trade Balance

Merchandise Trade Balance =
Value of Merchandise Exports – Value of Merchandise Imports

Nominal Interest Rate

Nominal Interest Rate = Real Interest Rate + Anticipated Inflation

Okun's Law

% increase in unemployment above natural rate × 2 = % decrease in output
(The 2 in the equation is an approximation.)

Production Efficiency Condition

$$\frac{w}{r} = \frac{MP_L}{MP_K}$$

Real GDP

$$\frac{\text{Nominal GDP}}{\text{CPI}^* \text{ for the same year as the nominal figure}} \times 100$$

*CPI or GDP deflator

Real Interest Rate

Real Interest Rate = Nominal Interest Rate – Anticipated Inflation

Rule of 70

$$\text{Doubling time} = \frac{70}{\%\text{ change per year}}$$

With 10% inflation, prices double in $\frac{70}{10} = 7$ years.

Slope

$$\frac{\text{Rise}}{\text{Run}}$$

Tax Multiplier

$$\text{Tax Multiplier} = -\frac{MPC}{MPS}$$

Total Amount of Deposits Resulting from an Initial Deposit That Is Ultimately Held as Reserves

$$\text{Simple Money (or Deposit) Multiplier} = \frac{1}{\text{Required Reserve Ratio}}$$

Unemployment Rate

$$\frac{\text{Unemployed}}{\text{Labor Force}}$$