AP Microeconomics: Exam Study Guide

Format: 60 MC questions worth 66.67% of total**.** 70 minutes to answer
- 20 questions are definitional

Example: The unemployment rate measures the percentage of
  (A) people in the labor force who do not have jobs
  (B) people in the labor force who have a part-time job but are looking for a full-time job
  (C) people who do not have jobs and have given up looking for work
  (D) people in the adult population who do not have jobs
  (E) people in the adult population who have temporary jobs

- 20 questions are analytical (require two step process to solve)

Example: If a commercial bank has no excess reserves and the reserve requirement is 10 percent, what is the value of new loans this bank can issue if a new customer deposits $10,000?
  (A) $100,000
  (B) $90,333
  (C) $10,000
  (D) $9,000
  (E) $1,000

- 20 questions are synthesis questions (require two or three thought processes to solve)

Example: Leather and beef are jointly produced such that an increase in the production of one results in an equal increase in the production of the other. An increase in the demand for leather will most likely cause
  (A) a decrease in the price of leather
  (B) a decrease in the price of beef
  (C) a decrease in the equilibrium quantity of beef sold
  (D) an increase in the demand for beef in the short run
  (E) an increase in the supply of leather

Three Free Response Questions worth 33.33% of total grade. 10 minutes of preparation time (used to sketch possible graphs and take notes) and 50 minutes to answer.
  o #1: Long FRQ – should take approximately 25 minutes to answer
  o #2 and 3: Short FRQs – should take approximately 12.5 minutes each to answer.

Circular Flow Diagram: This is so crucial to understand for both Micro and Macro! Study the flow of income in the resource and product markets, and pay attention to the role of government in the economy.
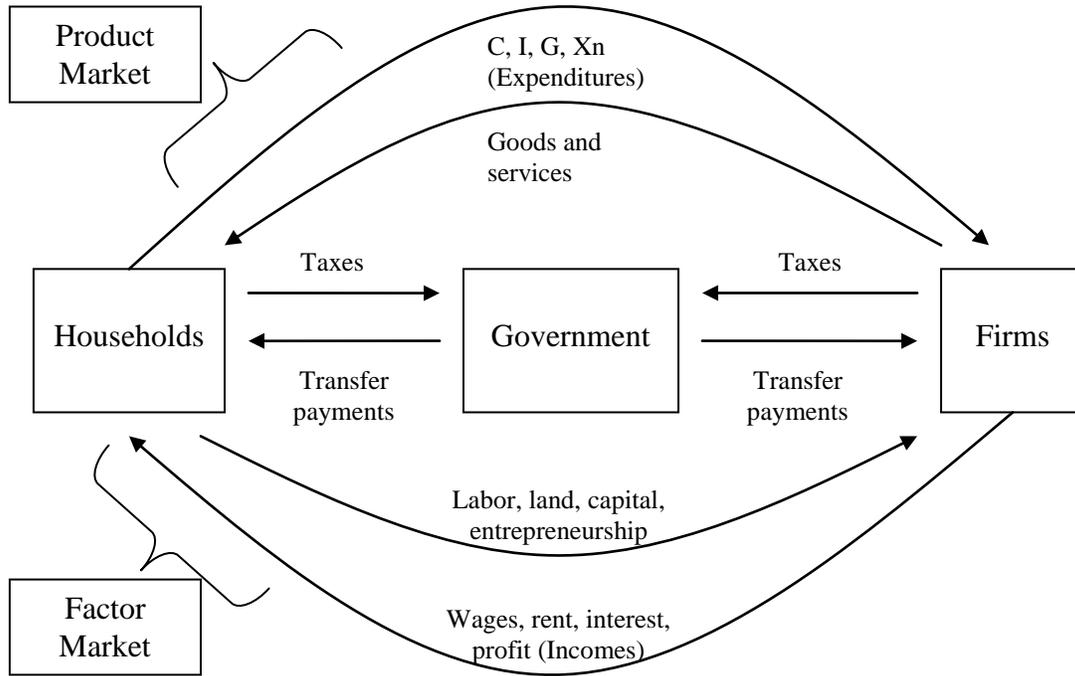
Implications of Circular Flow diagram: W + R + I + P = C + I + G + Xn

MICRO Concept Review:

Definitions

Supply: A schedule or curve showing the possible combinations of price and quantity supplied.
Law of Supply: There is a direct relationship between price and quantity supplied.

Demand: A schedule or curve showing the possible combinations of price and quantity demanded.
Law of Demand: There is an indirect relationship between price and quantity demanded
Reasons for the law of Demand (why the D curve slopes downward):
- **Income effect:** As price of a good decreases, consumers income *appears to increase*, so consumers demand a greater quantity of a good as the price goes down.
- **Substitution effect:** As the price of one good decreases, other goods *appear to become more expensive,* so consumers demand a greater quantity of the good whose price has decreased.
- **Diminishing marginal Utility:** The more one consumes of a good, the less additional utility that last unit consumed provides, therefore consumers are only willing to buy additional units of a good if the price decreases.

Normal goods: Goods for which Demand increases as consumer income increases (sometimes called *superior goods*).

Inferior goods: Goods for which Demand decreases as consumer income increases. (examples may include fast food, cheap clothes, etc…)

Determinants of Demand: A change in any of the following will result in a *shift of the demand curve,* meaning that at each possible price, a different quantity will be demanded.

T – consumers' tastes and preferences
O – other related goods' prices (compliments and substitutes)
E – expectations of future prices
I – consumers' income
S – size of the market (number of consumers)
S – special circumstances (tsunami, war, etc…)

Determinants of Supply: A change in any of the following will result in a *shift of the supply curve,* meaning that at each possible price a different quantity will be supplied.

S – subsidies (shift supply out) and taxes (shift supply in)
T – technology
O – other related goods prices (substitutes in production, i.e. basketballs and soccer balls)
R – resource costs (land, labor, capital, entrepreneurship)
E – expectations (of future prices)
S – size of the market (number of producers)

Elasticity: measures the responsiveness of one variable to a change in another.

- Price elasticity of Demand: ∑d
- Price elasticity of Supply: ∑s
- Cross elasticity of Demand: ∑xy

$$\sum d = \frac{\%\Delta Qd}{\%\Delta P}$$

$$\sum xy = \frac{\%\Delta Qd \text{ of good X}}{\%\Delta P \text{ of good Y}}$$

$$\sum s = \frac{\%\Delta Qs}{\%\Delta P}$$

∑>1 - elastic

∑<1 - inelastic

∑=1 – unit elastic

Determinants of price elasticity of demand:

S – substitutes
P – proportion of income
L – luxury or necessity
A – addictive or habit forming
T – time

Determinants of price elasticity of supply: Only TIME. As time goes by, firms are more responsive to changes in price.

- In the **"market period"** firms are unable to respond to price changes.
- In the **"short-run"** firms can intensify production using existing plants, therefore supply is more elastic.
- In the **"long-run"** firms can expand or reduce plant capacity, therefore supply is highly price elastic.

Total Revenue Test:

- If P↑ and TR↑ => inelastic D
- If P↓ and TR↓ => inelastic D
- If P↑ and TR↓ => elastic D
- If P↓ and TR↑ => elastic D

Rule of thumb: Price-elasticity of Demand tends to be higher for higher priced (luxury) goods since they make up a larger proportion of income. Price-elasticity of D tends to be lower for lower priced goods since they make up a smaller proportion of income.

The Utility Maximization Rule: The consumer should allocate his/her resources (money income) so that the last dollar spent on each product yields the same amount of extra, marginal utility.

Rule: $\dfrac{\text{MU of product A}}{\text{P of A}} = \dfrac{\text{MU of product B}}{\text{P of B}} = \dfrac{\text{MU of product C, D, E, etc…}}{\text{P of C, D, E, etc…}}$

Tax Incidence and Deadweight Loss
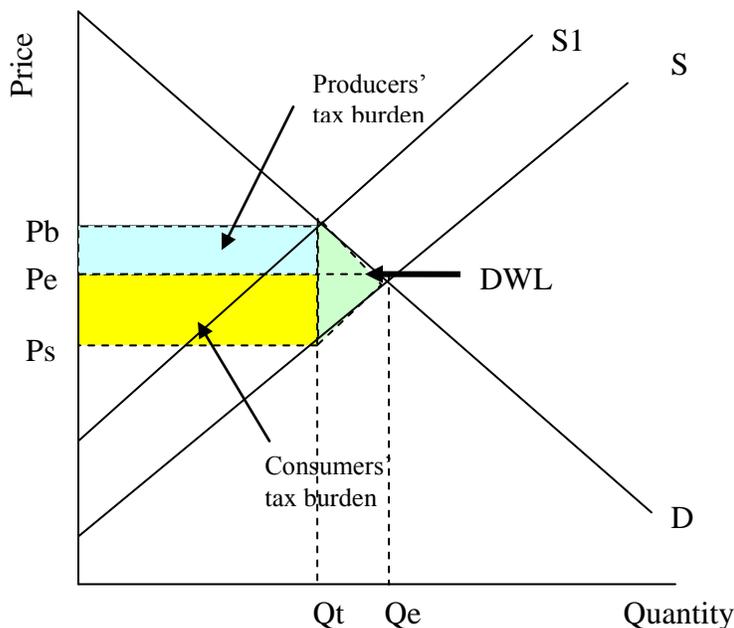
- Pe = Price at equilibrium, pre-tax
- Qe = Quantity demanded and supplied before tax
- Pb = Price buyers had to pay after the tax
- Px = Price sellers received after the tax
- Qt = Quantity demanded and supplied after the tax
- Blue box = Amount of tax born by the consumers in the form of lost consumer surplus
- Yellow box = Amount of tax born by producers in the form of lost producer surplus.
- Combined area of Blue and Yellow boxes = Tax Revenue
- Green box = DWL is the *total efficiency loss* that results from an under or over-allocation of resources towards the production of a good or service

Why would the government impose a tax on a good such as above? Doesn't it only lead to a disequilibrium and thus an under-allocation of resources towards the goods production? Yes, but what if this good creates negative externalities? What if S1 is closer to the MSC (Marginal Social Cost) curve whereas S is the MPC (Marginal Private Cost) curve? In these cases, a tax may be used to correct a market failure (such as second hand smoke or air pollution). Excise taxes like this also may be levied on goods simply to raise revenue to fund government spending (such as a new light rail system or other public or quasi-public goods).

Tax incidence and elasticity: Remember, if Demand is highly *inelastic* then consumers will bear the brunt of the tax burden (i.e. cigarettes and gasoline). If Demand is highly *elastic* then producers will bear the brunt of the tax burden. Be able to graph and explain tax burden with different Demand and Supply price-elasticities.

Costs of Production: You must understand the difference between explicit and implicit costs.
- **Implicit:** the opportunity cost of employing self-owned resources toward one activity rather than another (includes **NORMAL PROFIT**)
- **Explicit:** the money costs of employing resources owned by others, in the form of wages, rent and interest.
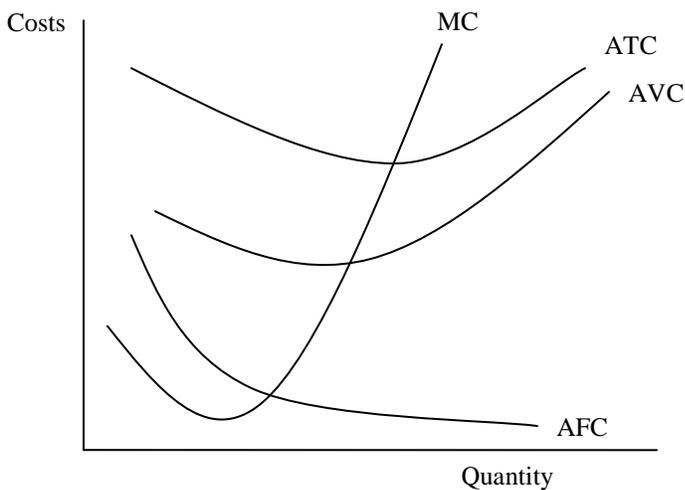
Other things to remember about costs:
- Total cost (TC) = Fixed costs (FC) + Variable costs (VC)
- ATC = AFC + AVC
- The distance between ATC and AVC represents AFC (which always declines as output increases b/c costs are "spread out").
- AVC is significant for firms to consider, b/c if price ever falls below AVC, the firms best option is to shut down, since it is no longer covering its fixed costs. It would minimize losses by shutting down!
- Again, notice that MC intersects both ATC and AVC at their lowest points; KNOW WHY!
- Understand how the law of diminishing returns influences the shapes of these curves.

What can cause cost curves to shift? A change in any variable cost (wages to workers, rent on land, interest on loans, etc…) will shift the MC, AVC and ATC curves. Also, an improvement in technology or productivity can cause the curves to shift DOWN.

Why is the MC curve an individual firm's supply curve above the AVC? Keep this in mind. A firm will respond to price increases by increasing output as long as price is above AVC (remember the shutdown rule mentioned above). If a firm faces lower costs (wages, rents, interest) then its MC will shift down; this translates to an outward shift of the individual firm's supply curve, meaning that at each price, the firm is willing to supply more output!!

Perfect Competition: YOU MUST KNOW EVERYTHING ABOUT "PC".
- Be able to draw a PC market with a representative firm. This skill helps you to understand all other market structures.
- Must ALWAYS include the AVC curve in PC graphs!
- Be able to illustrate the scenario where a firm is earning economic profits (or losses) and describe the long-run adjustments that lead to the elimination of those profits (or losses).
- Understand the "shut-down" scenario (when P falls below AVC)
- Know the characteristics of a PC industry: no barriers to entry, homogeneous product, low start-up costs, etc…
- Understand why the PC firm's Demand curve is perfectly elastic (firms are price takers) and why D = MR = AR = P.
- Again, understand that a firm's MC curve above its AVC IS ITS SUPPLY CURVE. The horizontal sum of all individual firms' MC curves in a given market is the industry Supply curve.
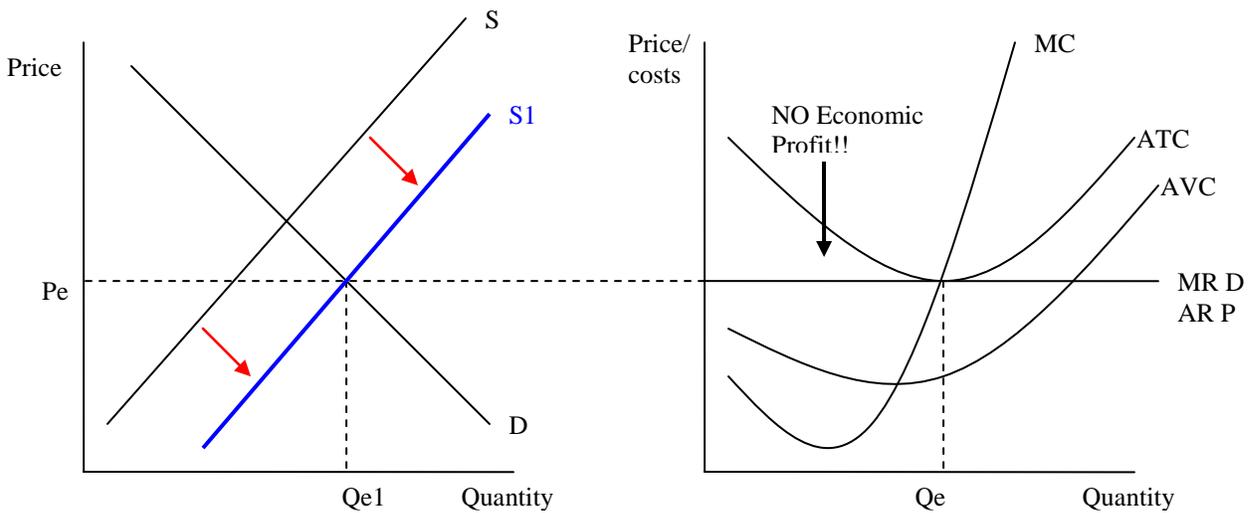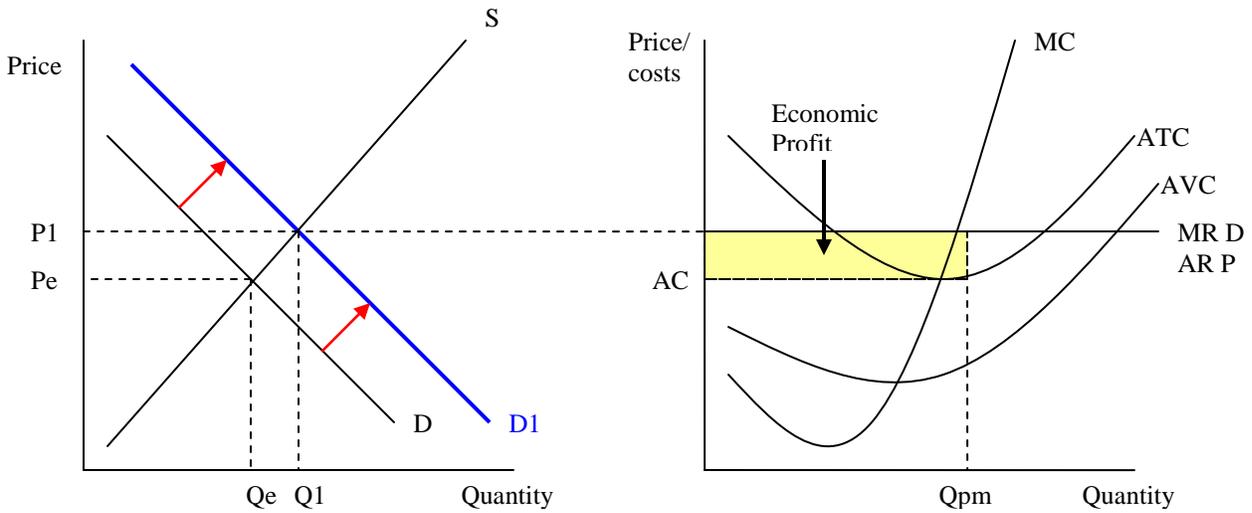
PC Graphs: You must understand and be able to illustrate a scenario such as above where…

- An initial increase in D for a product drives up price above min ATC. Firms earn economic profits in the short-run.
- Remember, profits are "FIRM MAGNETS", so new firms enter this PC market since there are no barriers to entry and there are profits to be had!
- The new firms output pushes the market Supply curve outward, which lowers the market price.
- Price will fall back to the minimum ATC, at which point firms earn ZERO economic profits, only normal profits.

What if price falls below minimum ATC? This may happen if the initial shift of the Demand curve had been to the left, due to a decrease in Demand for the product in question.

- This will mean in the short-run firms will earn economic losses.
- Remember, LOSSES ARE "FIRM REPELLANTS". Firms are scared off by losses! Since there are no barriers to exit, firms will leave the industry to seek profits elsewhere.
- The exit of firms will shift the market supply curve to the left, increasing the price until losses are eliminated, restoring equilibrium.

REMEMBER: In the long-run equilibrium in perfect competition…
- Firms will only *break even* (earn zero economic profits).
- Price will be equal to Marginal Cost (this assures **ALLOCATIVE EFFICIENCY)**
- Price will be equal to minimum Average Total Cost (this assures **PRODUCTIVE EFFICIENCY)**
  Thus: PC industries are the most efficient type of market structure.

Consumer and Producer Surplus: CS is the area above the price line and below the Demand curve. Producer Surplus is the area below the price line and above the Supply (or Marginal Cost) curve. This is true for any market structure.

In Monopoly
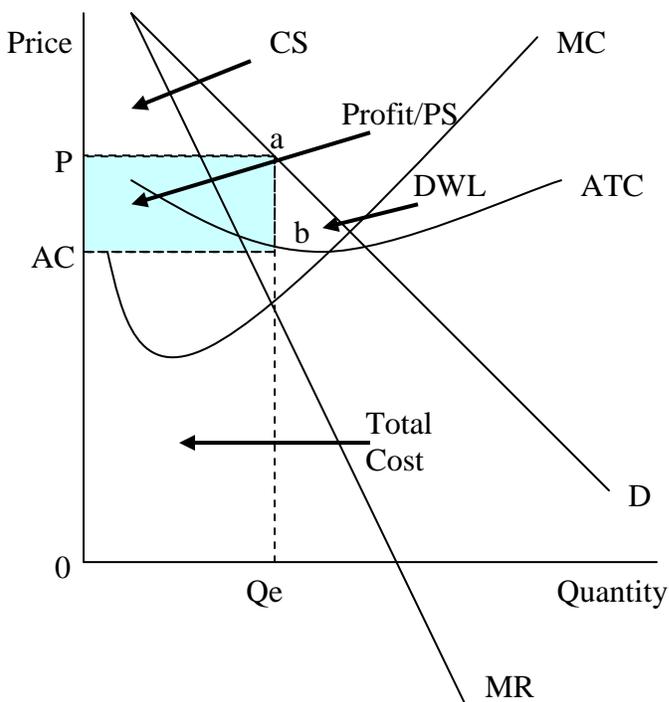
**Things to notice about the Monopoly graph above:**
- Marginal Revenue lies below Demand: Since a monopolist is the only seller of its product, in order to sell additional units, it must lower the price of all previous units, so its MR falls at a faster rate than the price it charges.
- There is Consumer Surplus in a single-price monopoly. Again, the area above the single price line and below the Demand curve represents CS.
- The Producer Surplus exists in the area below the price line and above the firm's MC curve. This represents the additional wellbeing attained by selling for a price above the MC of production.
- The firm is achieving economic profit (TR – TC > 0). This is because it is able to restrict output to the MC = MR level in order to maximize profit (represented by the rectangle P, a, b, AC).
- TC is found by taking the firms ATC at the profit maximizing level of output and multiplying it by output. This is represented by the rectangle AC, b, Qe, 0.

- Just as in all markets, the firm's MC curve sloped downward in the early level of output (due to increasing marginal returns) then upwards as output increases (due to the law of diminishing marginal returns).
- Notice that the MC intersects the ATC curve at its lowest point. You MUST know why this happens: **because if the cost of the last unit produced was lower than the average unit, then average cost will decrease, and vis versa (remember your grade in class; if you do better on this test than you've averaged in the class, your average will go up!)**
- Notice that there is Deadweight Loss in a monopoly! This means monopolies are an example of a **MARKET FAILURE!** Resources are under-allocated towards the production of the good!

Other points of review on Monopoly:
- Understand how an unregulated monopoly will restrict output to maximize profits (thus it's a market failure)
- Understand the characteristics and implications of a *natural monopoly* (see below).
- Review and understand the implications of a perfectly price discriminating monopolist: *Consumer surplus is turned into profit for the firm, allocative efficiency is achieved since the last price charged is equal to MC, and deadweight loss is eliminated!* **Notice: price discrimination could be thought of as beneficial to society for these reasons!**

Price Discriminating Monopoly
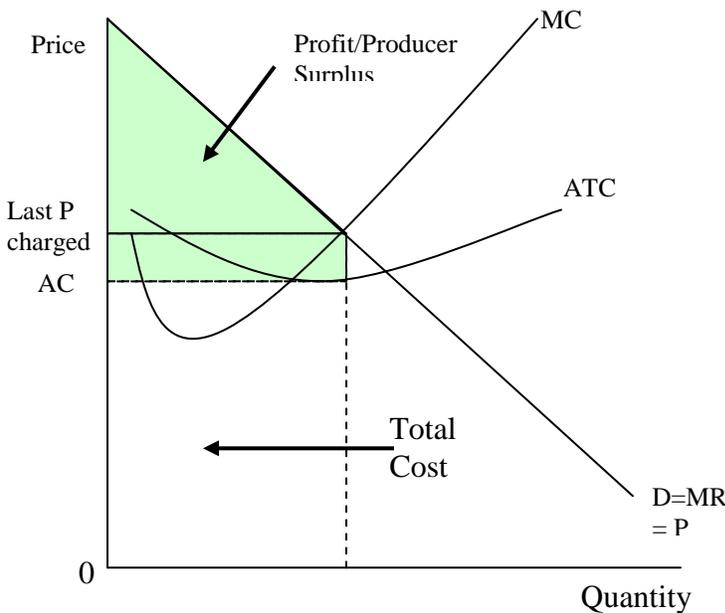
Graph for price discrimination:
- All Consumer Surplus from the single – price firm is turned into monopolist profit and producer surplus (the green trapezoid)
- MR shifts up to align with D (P) price charged for the last unit sold is different for each unit, allowing the firm to extract the from each buyer exactly what he or she is willing to pay.
- Monopolist now produces at the profit maximizing level of output (MR = MC).
- P = MC, so allocative efficiency is achieved.
- Notice, productive efficiency is not achieved, as the monopolist is not producing at min. ATC.

Formula for Market Power: This useful formula can be used to measure the amount of market power held by an individual firm.

Market Power (Lerner index) $\quad$ **L** $=$ $\dfrac{(P - MC)}{P}$

- In perfect competition, P = MC, so L will be Zero!!
- In monopoly, P will always be greater than MC, so this will be a positive number.
- The higher price is than marginal cost, the more market power the firm has.

Natural Monopoly (This could VERY LIKELY be on the FRQ section this year): A natural monopoly exists when the market Demand for a good intersects the long-run ATC curve while it is still in the downward sloping (economies of scale) section. In other words, it is more efficient for one firm to provide the product than for several firms to, since there is insufficient demand for even one firm to achieve minimum efficient scale.

Natural monopolies sometimes exist in industries in which economies of scale are significant and the market demand is insufficient for a firm to achieve minimum efficient scale. In other words, one monopolistic provider can meet market demand at a lower ATC than if multiple firms were to split the market among themselves. Study the graph below and understand how the following are determined
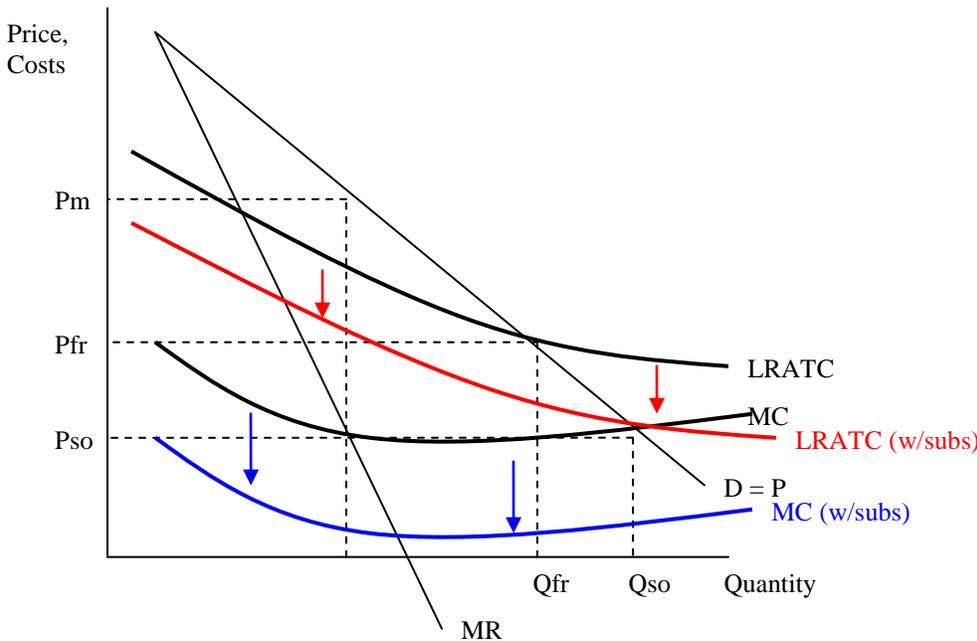
Natural Monopoly graph:

- **Pm and Qm:** These are the price and output of an unregulated monopoly; occur at the profit maximizing output level where MR = MC
- **Pso and Qso:** These are the *socially optimal* price and output levels. They are determined by producing where D (P) = MC, since this point represents allocative efficiency. This combination of P and Q will lead to the monopolist shutting down, since P is less than ATC.

- **Pfr and Qfr:** This is the fair-return price and output level. Regulators may choose to set a price ceiling at Pfr so that the monopolist can still maintain normal profits (P = ATC), but still increase output so it's closer to the socially optimal level. If the monopolist were forced to sell at a price lower than this, it would earn losses and eventually shut down.

Alternatives to a price ceiling at Pfr: Notice that a regulatory commission's price ceiling at Pfr, while it does increase output and lower price, is still below the socially optimal level of output (and price is still above socially optimal price).
- An alternative to a price ceiling is **a direct subsidy to the monopolistic firm**.
- Remember, Subsidies are a determinant of supply. In other words, a subsidy would shift the MC and LRATC curves downward, allowing the firm to produce a greater quantity at a lower cost (thus price to the consumer) further helping achieve a more socially optimal price and output.
- Notice LRATC (w/sub): The subsidy shifts the firm's costs down, allowing it to achieve normal profits at the socially optimal level of output and price.

Definitions:

**Economic Rent:** Additional income received for going to an alternative job.
Example:
- Shaquille O'neal earned $22,000 as a DJ his last year before joining the NBA
- During his first year, Shaq earned $22,000,000.
- His economic rent had he chosen to remain a DJ would have been $22m - $22k = $21,978,000. *Shaq would have paid very high economic rent had he remained a DJ*

Rent-seeking behavior: This is any expenditure made by a firm to achieve or try to preserve monopoly power. *Lobbying!!* This may be Microsoft trying to defend its right to bundle Internet Explorer with its Windows operating system, or a steel company paying lobbyists to influence legislatures to place high tariffs on imported steel.

Excess capacity: When firms produce less than the socially optimal quantity in order to maximize profits. Excess capacity exists in any imperfectly competitive market. If firms are not producing at their minimum ATC, they probably have excess capacity.

From Monopoly to Pure Competition: It is very common for an FRQ to pose a scenario where you *"suppose an industry that was monopolistic becomes perfectly competitive"* or something like that. You must be able to graph and explain the transition from monopoly to pure competition and the implications on price, output, CS, and efficiency.
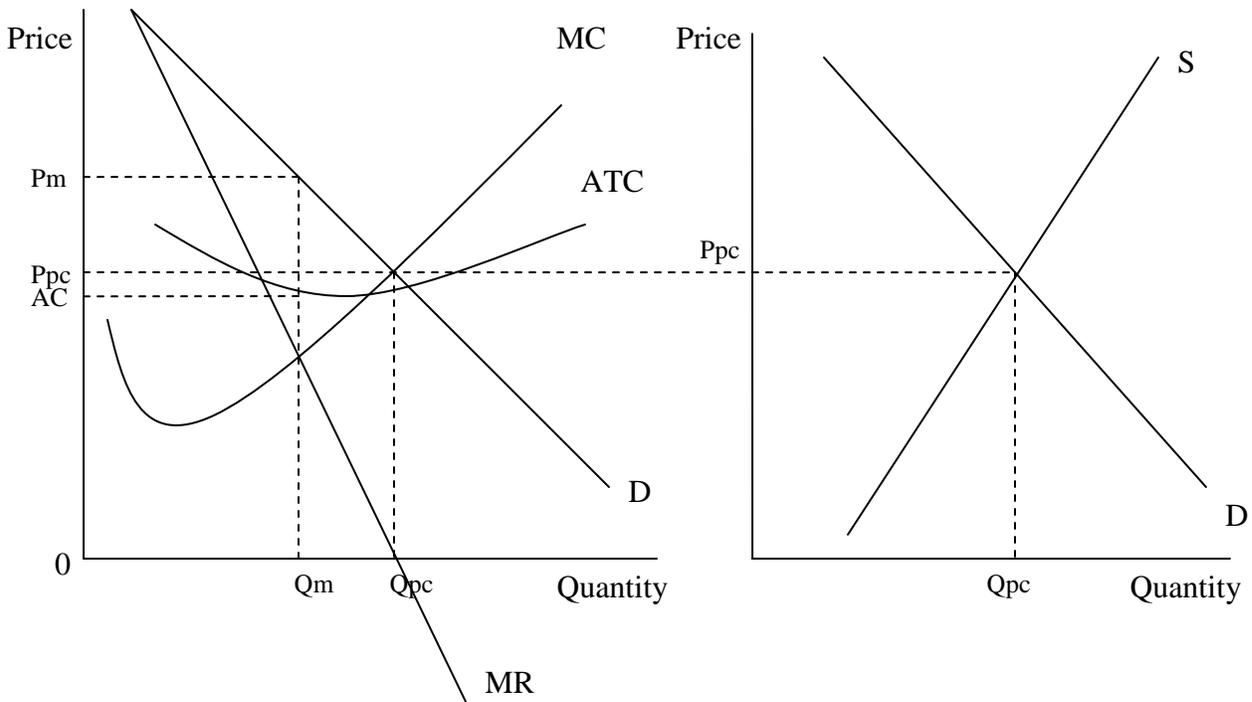
From monopoly to perfect competition graphs:

- Be sure to emphasize that in PC, price is lower and output higher. This is because perfect competition assures that an efficient, market clearing price and output are achieved.
- Notice that in monopoly, output is lower and price is higher than in pure competition.
- Notice that the price in pure competition can be found in the monopoly diagram by finding the intersection of P and MC, since we know that this is the outcome of purely competitive markets.
- You may also need to draw a perfectly competitive firm alongside these to graphs. Look in the early section on PC for a firm diagram.

Monopolistic Competition: The major difference b/w monopolistic competition and perfect competition is **PRODUCT DIFFERENTIATION!!**
- Firms advertise to differentiate themselves from their competition. This allows them to have slight control over price (think of Colgate and Crest sitting on the shelf at Carrefour; they probably cost more than the 50 other Chinese brands of toothpaste).
- Barriers to entry and exit are LOW, so if economic profits are being earned, then firms will enter (if losses are earned, firms will exit). **Knowing this, we can conclude that in the long-run, monopolistic competitors should only earn normal profits!**
- However, due to successful advertising and **BRAND LOYALTY**, some firms in monopolistically competitive markets are able to maintain economic profits in the long-run.
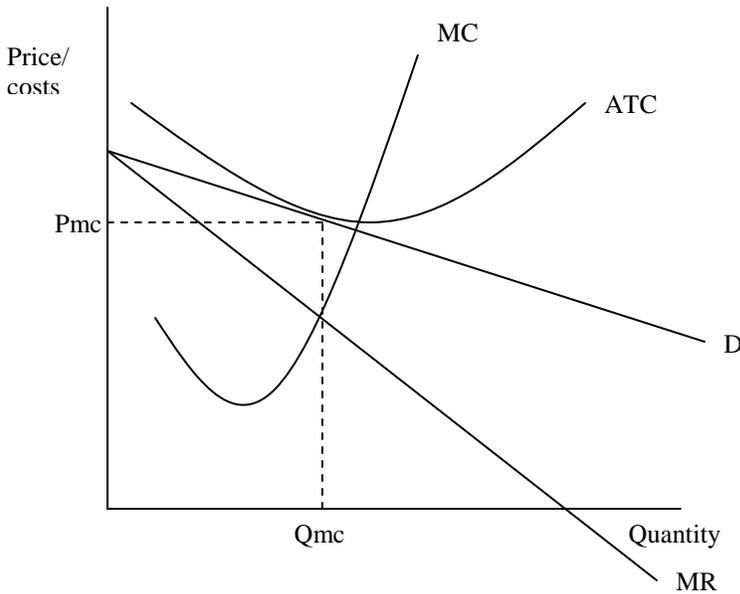
Monopolistic Competition graph:
- D is more elastic than in monopoly, b/c there are more substitutes for the product.
- MR lies below D (and P) b/c in order to sell additional output, firms must lower the price of all previous units of output.
- This firm is in equilibrium, b/c ATC is tangent to the D curve. Due to low barriers to entry, if D were to shift out and P go up, more firms would enter, shift the D curve faced by the individual firm back in, lowering price back to the level of ATC.
- **Notice:** Although it appears to be close to min. ATC, this firm is not achieving min. ATC, so **it is not productively efficient.**
- At the profit maximizing level of output (where MR = MC) P does not equal MC (since P is greater than MR). Therefore, **this firm is not achieving allocative efficiency**.
- Monopolistically competitive firms are destined to earn only **NORMAL PROFITS** and the industry is **INEFFICIENT** since there is an under-allocation of resources towards the production of this good.

Oligopoly and Game Theory: The AP does not test on kinked Demand curve theory, therefore you must review Game Theory as a tool for understanding the behavior of oligopolistic firms. First review the characteristics of Oligopolies:
1. Only a few firms (2-20)
2. High barriers to entry
3. Homogenous (diamonds and metals) or differentiated (Boeing vs. Airbus, operating systems) products
4. **INTERDEPENDENCE:** In other words, one firms pricing and output decisions are based entirely on what its competitors will do!

Game Theory: It has been hinted that this could VERY LIKELY appear in the FRQ section of this year's exam!
- Oligopolies' behavior is like a game, because competitors play for payoffs:
  1. win – win

2. win – lose
3. lose – lose

- Games are usually played by choosing a pricing or advertising strategy based on a competitor's decision.
- The strategy for a player is one that maximizes expected payoff.
- Games can be cooperative or non-cooperative
    1. Cooperative: players negotiate binding contracts, which leads to joint strategies. Usually only possible if there are a small number of players (an economic example of this is cartels)
    2. Non-cooperative: enforcement of contracts is difficult or impossible, usually because there are a large number of players (firms) involved; there is too much of an incentive to "cheat" (by either lowering prices to steal customers or by advertising to attract customers from competitors).
- Players MUST take into account the *likely* behavior of other players (firms).

TWO possible outcomes you must know for the AP exam:

1. **Dominant Strategy:** this is the strategy that's optimal regardless of what an opponent does. Firms do NOT always have a dominant strategy!!
2. **Nash Equilibrium:** the set of strategies in which each firm does the best it can given its competitors' actions; because each player has no incentive to deviate from its Nash strategy.

**SEE GAME THEORY APPENDIX FOR FURTHER REVIEW
AND EXAMPLES OF PAYOFF MATRIXES.**

Resource Markets: This is where firms go to hire works, rent land, borrow money, and so on. Refer to the circular flow diagram to see what transactions take place in the resource (factor) market. Resource demand is **DERIVED DEMAND**. Demand for any input is derived from the demand for the output that those inputs produce

Main points about resource demand:

- Firms will hire workers (or other inputs) until the Marginal Resource Cost (MRC) = Marginal Revenue Product (MRP)
    - MRC: The additional cost to a firm of hiring one more worker.
    - MPP: Marginal physical product. This is the number of additional units contributed by the last worker hired.
    - MRP: The amount of additional revenue contributed by the last worker hired. MRP = MPP x P
- In a resource market, the Supply curve represents households (who provide the productive resources) and the Demand curve represents firms (which require resources to produce anything).
- A firm's Demand for labor curve is the same as the MRP curve.
- In a purely competitive labor market, firms are wage takers; in other words no matter how many workers a firm hires, it cannot affect the market wage rate.

Perfectly competitive labor market and firm

Labor Market   Individual Firm
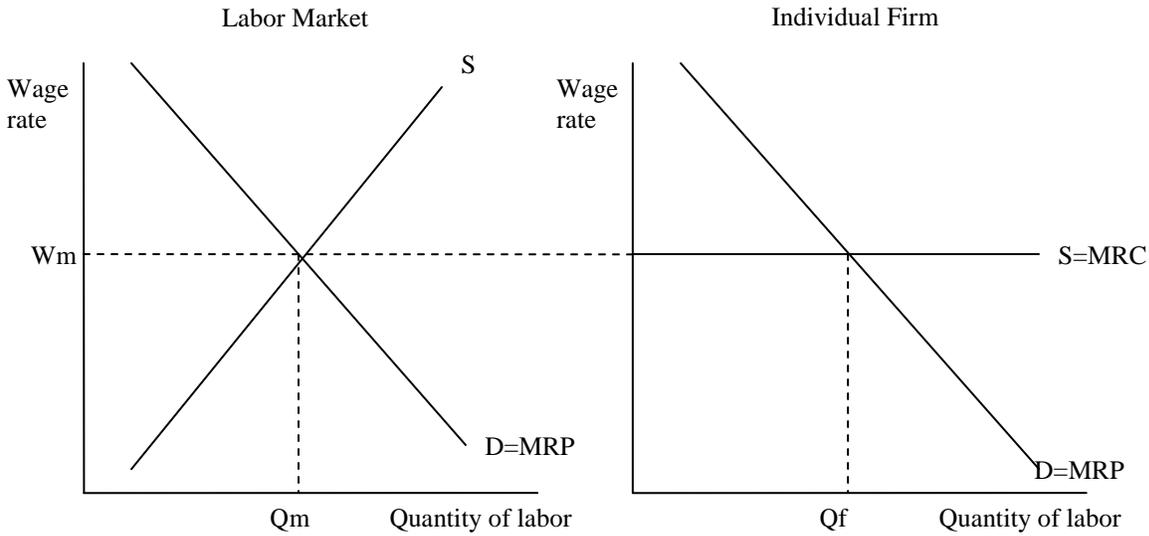
Least-cost Rule of employing resources: In order to produce a specific output with the *least-cost combination of resources* a firm should employ labor and capital up to the point where the last dollar spent on each resource yields the same marginal product.

- **Least cost combination of Labor and Capital:** $\dfrac{MPP_L}{P_L} = \dfrac{MPP_C}{P_C}$

Profit-maximizing Rule of employing resources: In competitive markets, a firm will achieve its profit-maximizing combination of resources when each resource is employed to the point at which its marginal revenue product equals its price.

- **Profit-maximizing combination of Labor and Capital**: $P_L = MRP_L$ and $P_C = MRP_C$
- **Or stated otherwise**: $\dfrac{MRP_L}{P_L} = \dfrac{MRP_C}{P_C} = 1$

Monopsony: A monopsonistic firm is one that is the sole employer in a particular labor market. Similar to a Monopoly in a product market, except in the firm is now a *wage maker*, not a wage taker as in a purely competitive labor market. In other words, in order to attract an additional worker, the firm must raise wages for all workers hired previously. For that reason, a monopsonist's MRC curve lies above its Supply of labor curve.
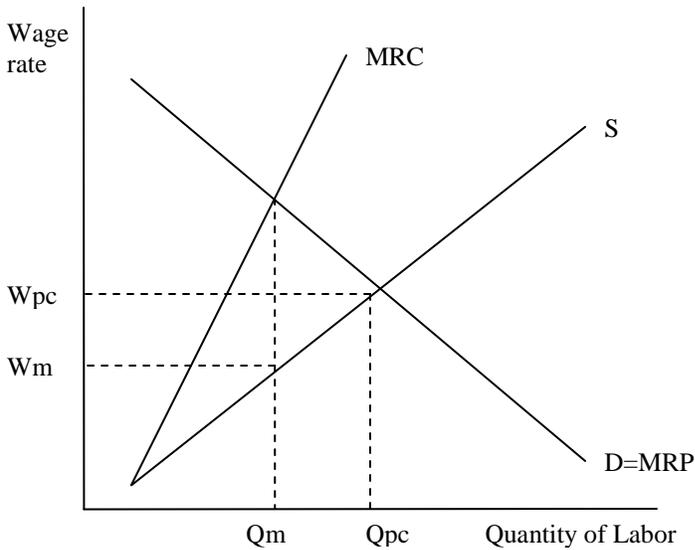
Monopsony Graph: Observations…
- The monopsonist will employ workers up to the point where the MRP = the MRC.
- The monopsonist will only pay the wage necessary to attract Qm workers
- At Qm (quantity of labor demanded by the firm), the firm has to pay a wage rate of Wm.
- Notice that if this were a purely competitive labor market, the Supply curve and the MRC curve would be the same, and firms would employ Qpc and pay a wage rate of Wpc.
- **Conclusion:** Monopsony employers hire fewer workers and pay lower wages than firms in a purely competitive labor market.

Market Failure: Markets sometimes fail to achieve an efficient or socially optimal price and output level. This may be for four reasons:

1. Public Goods *(this is the most commonly tested market failure in the AP and should appear as a definitional MC problem)*
   a. *Non-rival in consumption*
   b. *Non-excludable*
   c. *Free-rider problem*
   *Public goods are not provided by the market because of the above characteristics they possess. They simply cannot be broken down into sellable units.
2. Positive and Negative externalities
   a. Spillover benefits
   b. Spillover costs
3. Imperfectly competitive markets
   a. Monopoly
   b. Oligopoly
   c. Monopolistic competition
4. Asymmetrical information: someone has access to information that someone else doesn't, so market price does not account for the true cost.
5. Moral Hazard: a type of information failure usually associated with insurance where a buyer of insurance keeps information from the insurance company that it should know.

Graphing Market Failure: For the exam, you must be able to graph positive and negative externalities and imperfect competition (covered above).

Negative Externality

Positive Externality
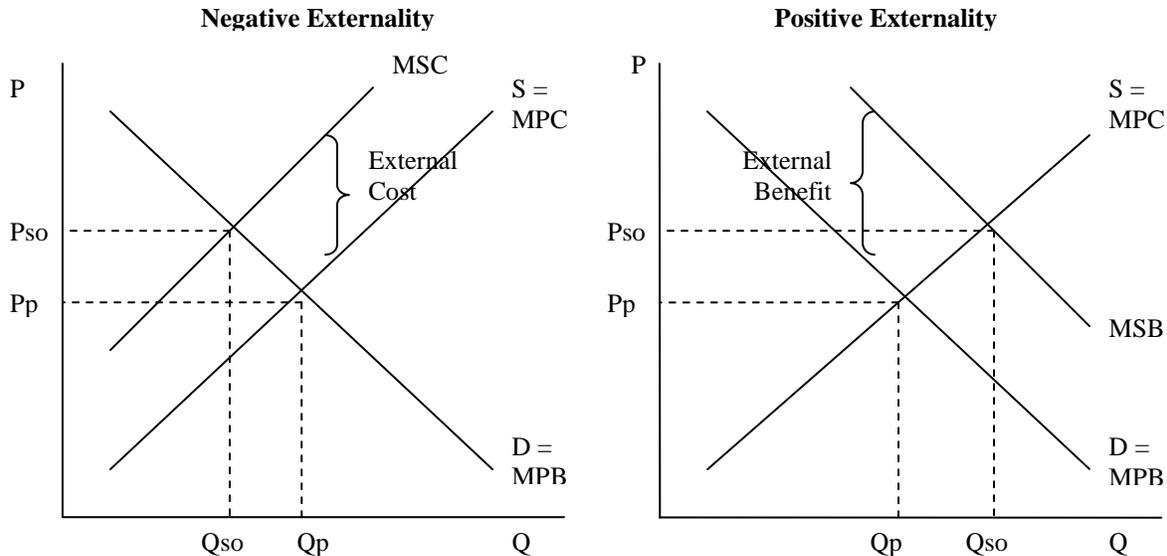
Understanding the externality graphs:

*   Negative externality: This may represent a market for electricity generated by burning coal.
    *   Pp and Qp represent a price and output when external costs are ignored
    *   Pso and Qso are the socially optimal price and output, which take into account the amount of costs spilled over onto society.
*   Positive externality: This may represent a market for vaccinations.
    *   Pp and Qp represent the price and output when the positive benefits of vaccinations are ignored.
    *   Pso and Qso represent the price and output when the positive benefits of vaccinations are taken into account.

Tools for correcting market failure:

1. Direct government regulation: government can require firms to provide a good that produces spillover benefits (such as public goods) or require firms NOT to produce goods that have spillover costs.
2. Taxes and subsidies: Government can tax firms producing goods that create negative externalities (shifting the MPC curve up towards the level of MSC) or subsidize producers or consumers of goods that create positive externalities (shifting the MPB curve in the direction of MSB or the MPC curve in the direction of MSC).
3. Government provision: The government can provide (or contract out the provision of) public goods such as roads, the postal system, national defense, education, etc...

4. Market for externality rights: The government and scientists can decide on an acceptable level of a particular harmful spillover of production such as pollution. It can issue each polluting firm a certain number of permits, the total of which equals the acceptable amount of pollution. Firms that are already polluting less than their permits allow them to can sell those permits to firms that are polluting more than they're permitted to. This gives ALL FIRMS AN INCENTIVE TO REDUCE THEIR POLLUTION, SINCE PROFITS CAN BE EARNED BY NOT CLEANING UP!

5. The Coase Theorem: Would only work when a few parties are involved; involves direct negotiation between the party creating a spillover cost and the party suffering from it.