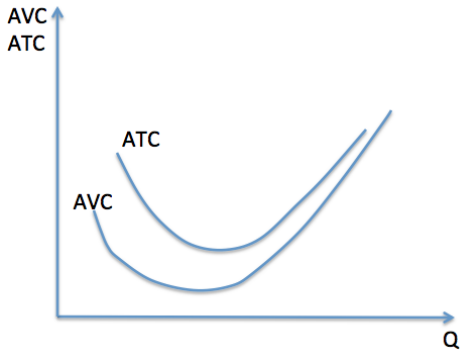
Multiple Choice Questions: (Each 2 points)

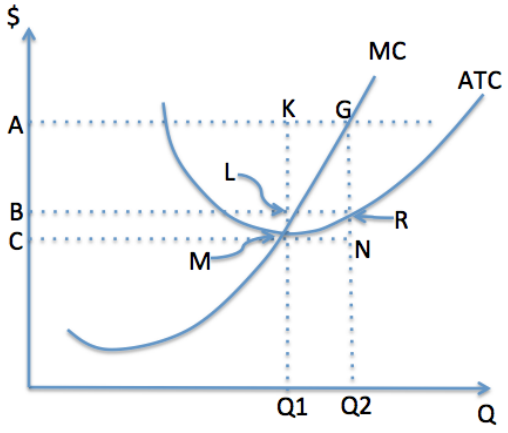
1. The following curve depicting the average total cost and the average variable cost shows the two curves converging as output increases because
   A. fixed costs are increasing.
   B. variable costs increase at an increasing rate.
   C. average fixed cost is decreasing.
   D. average fixed cost is constant.
   E. variable costs increase at an increasing rate.



2. If a firm can reduce its ATC by switching to another scale, then we can be sure that

   A. currently firm is operating where ATC is decreasing.
   B. currently firm is operating where ATC is increasing.
   C. marginal cost must be flat.
   D. capacity has been reached.
   E. doubling the size will not double the costs.

3. If the firm pictured below faces a price shown at A, then the firm
   A. earns a profit equal to the area of AKLB
   B. earns a revenue equal to the area of ABRG
   C. earns a profit equal to ACNG
   D. incurs a total cost equal to the area of BCNR
   E. earns a profit equal to the area of ABRG



4. Market Failure occurs when
   I. there are negative externalities
   II. there are positive externalities
   III. there is free riding
   IV. private cost and social cost coincide

   A. I
   B. I and III
   C. I, III, IV
   D. I, II, III
   E. I, II, III, IV

5. The following are true about advertising except
   A. It plays a more effective role in monopolistically competitive markets than in perfectly competitive markets
   B. **It is used to reduce product differentiation**
   C. It is used to make a firm's demand curve less price sensitive.
   D. It is used to increase a firm's market share.
   E. It is used to reduce consumer sensitivity to price changes.

Determine whether each of the following statements TRUE or FALSE. In either case, briefly explain your reasoning. (3 points each)

1. **TRUE**/FALSE: Perfect Competition is not necessarily the best market structure for encouraging innovation.

There is some evidence that large amounts of funds that is accumulated by a monopoly may further the kind of research that could have not been undertaken by startups. Also, even though new firms cannot enter into a monopolistic market, the promise of high profit creates an incentive for finding and commercializing alternatives, which is what happened to the railway industry by the introduction of other forms of long distance transportation.

2. TRUE/**FALSE**: The "short-run" in the life of a business is widely accepted as 2 to 3 years.

The duration of "short run" changes from business to business. For instance, it may take less time to change the scale of a software company than to change the scale of a jet engine company.

3. TRUE/**FALSE**: A business owner who continues to produce with zero economic profit is not making efficient use of the resources.

Calculation of economic profit takes into account the opportunity costs, that is, the best alternative use of all the resources and makes sure that they are covered. Then, a business owner who is making zero economic profit is not wasting resources.

4. TRUE/**FALSE**: "Money Burning" refers to unintended inefficiencies that occur during the production process.

"Money Burning" refers to intentional and seemingly unnecessary spending with no direct benefits to the business. However, it is designed to send a signal to the competitors about the firm's ability to afford even such unnecessary expense.

5. **TRUE**/FALSE: Price customization software used on online trading is a form of price discrimination.

Price discrimination is the act of charging different prices to different segments of the market. Customizing prices by deducing each consumer's willingness to pay from their web surfing behavior/ the computers they use etc. is a form of price discrimination.

6. TRUE/**FALSE**: Company A and B are competing in the same market. As A increases its advertisement spending, the demand for A's products will be more price sensitive and the demand for B's products will be less price sensitive.

The purpose of advertisement spending is to convince consumers to buy A's products regardless of changes in its prices. Therefore, the objective is to reduce the price sensitivity to A's products and capture B's customers thereby increasing the price sensitivity to B's products.

7. TRUE/**FALSE**: Given fixed capital and equipment, labor efficiency increases continuously as the size of the labor force is increased.

Given fixed capital and equipment, eventually there will be capacity problems with increased labor force and the increase in output per labor unit will slow down.

8. TRUE/**FALSE**: If Marginal Revenue is equal to Average Total Cost at the optimal production level, then we can be sure that firm is making zero economic profit.

Not necessarily. If the market structure is not perfectly competitive, then $P \neq MR$ which means $P \neq ATC$. Then $\Pi = Q(P-ATC) \neq 0$.

9. TRUE/**FALSE**: The voice recognition technology that is ultimately used by Apple Inc., is an example of how the current patent laws are protecting all firms which contribute to an original invention.

Vlingo was not protected by patent laws even though it contributed to the voice recognition technology.

10. TRUE/**FALSE**: Suppose UCLA does not charge a fixed tuition but instead asks for a percentage of the salary after graduation. Also, suppose that UCLA is the only higher education institution implementing this system. Then, if a student with high expected future earnings still attends UCLA, we would describe this as an "irrational behavior" in economics.

If one option costs more than the other while being exactly the same in other aspects, then it is irrational to pick it. While UCLA may be more costly for the above mentioned student, other properties of UCLA may make up for it, location, proximity to family etc.

Numeric Problems:

1. (7 points) Production of the new iPad Mini covers by Belkin Inc., involves two stages.

Stages	Time required for the first unit	Learning Curve Rate	Labor Cost per Hour
Stage 1	1 hour and 15 minutes	0.95	$8.5
Stage 2	2 hours	0.80	$12

What is the labor cost of the 10,000th unit?

Stage 1:
*T (10,000th) = (75 mins/ 60 mins) * $8.50 * 10,000 ^ (log (0.95)/log(2)) = $ 5.37*
Stage 2:
*T (10,000th) = (120 mins/ 60 mins) * $12.00 * 10,000 ^ (log (0.80)/ log (2)) = $ 1.24*

The labor costs of 1000th piece is $ 6.61

2. (7 points) The warehouse that your company is using is 20,000 sq. ft. and was constructed 10 years ago for $860,000. Prices in construction sector were increasing by 3% per year for the past ten years. If the relevant power-sizing exponent is 0.69, how much would it cost to build a 40,000 sq. ft. warehouse today?

You can either account for the price increase first and than size increase or vice versa.

*Per sq. ft. cost now = 860,000**$(1.03)^{10}$*= $1,155,768*

$$\text{Cost}_A = \text{Cost}_B\left(\frac{\text{Size}_A}{\text{Size}_B}\right)^X$$

*Cost of a 40,000 sq. ft. warehouse today = 1,155,768 **$(40{,}000/20{,}000)^{.69}$ = $1,864,581*

3. (7 points) How long will it take for an investment to triple at 4% APR compounded annually if half of the interest accumulated within the previous year is withdrawn at the end of each year?

This question is the same as the following question: "How long will it take for an investment to triple at 2% APR compounded annually?"

In order to see this suppose $x is invested at 4% annually.
At the end of the first year total accumulation will be:

$$x(1+0.04) - \frac{0.04x}{2} = x(1+0.02)$$

At the end of the second year total accumulation is:

$$x(1+0.02)(1+0.04) - \frac{0.04\,x(1+0.02)}{2} = x(1+0.02)^2$$

At the end of the n^{th} year, the total accumulation is $x(1+0.02)^n$.

Then $x(1+0.02)^n = 3x$ ➔ *n=ln3/ln1.02 = 55.48 years.*

4. (6 points) Remember the article you read on patent wars and the subsequent discussion we had in class. Vlingo is the company which was sued by another company, Nuance, for voice recognition patent infringement. When these companies were first getting started, assume that they had two options to direct their limited funds to: do research only, or allocate money between research and patent application.

Each cell in the following table shows the payoff that each company would get under different scenarios. For example, if Nuance does only research and Vlingo allocates money between patents and research, Nuance's payoff is -10 and Vlingo's payoff is 60.

a) Which cell best describes what actually happened for these companies in real life?

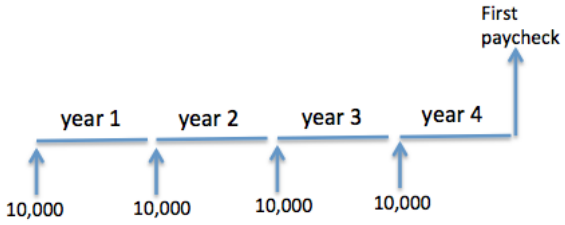
(-10,60)

b) Given the following formulation, what strategy should have been picked by each company (assume each behaves in its best interest)? Would this be the best outcome for the society?

(10,10) should have been picked but this would not be the best outcome. Best outcome is (50,50).

		Nuance	
		Patent&Research	Research Only
Vlingo	Patent&Research	10,10	60, -10
	Research Only	-10,60	50,50

5. 8 points) Michael borrows $10,000 at the beginning of each year for 4 years to pay his tuition. The bank charges annual 6% compounded monthly effective as soon as the money is borrowed. Michael does not make any payments until the end of his 4th year which is exactly when he gets his first paycheck. At least how much should be the first paycheck for Michael to obtain a positive return on the total tuition he accumulated?



$10{,}000[(1+0.06/12)^{48} + (1+0.06/12)^{36} + (1+0.06/12)^{24} + (1+0.06/12)^{12}]$

or equivalently; 10,000[(F/P, ½%,48)+ (F/P, ½%,36)+ (F/P, ½%,24)+ (F/P, ½%,12)] =$46,560

6. (6 points) A firm, operating in a perfectly competitive environment, has a fixed cost of 1,000 and the variable cost structure as shown below. If price is 920 how many units should the firm produce and what is the profit at this production level?

Quantity	TVC	ATC	MC
0	0	-	-
1	600	1,600	600
2	1,000	1,000	400
3	1,300	767	300
4	2,200	800	900
5	3,300	860	1,100
6	4,800	967	1,500

*Profit is maximized when Q=4, and Profit = 4*920-3,200 = 480*

7. (6 points) You invested $1,000 with a bank today at an annual rate of 12% for 5 years. For the first 3 years, the bank compounded interest annually and for the last two years interest was compounded monthly. What was your effective annual rate at the end of five years?

$$1{,}000(1+0.12)^3(1+.01)^{24}=1{,}000(1+\mathrm{i})^5$$

i=12.27%

8. (8 points) Lisa can get a basic model of iPhone for $600 without having to sign up with a carrier. If she signs a contract with Verizon, she can get it for $200. To make up for the difference, Verizon requires Lisa to make constant monthly payments for 2 years (total of 24 payments) starting from a month from the purchase date. At the time of the purchase, annual interest rate is 6%. After a year, Verizon increases the constant monthly payment for the rest of the contract due to an increase in the interest rates from 6% to 9%.

By how much should the constant monthly payment be increased so that Verizon exactly makes up for the discounted iPhone price?

Let A_1 be the monthly payment for the first year and A_2 be the monthly payment for the second year.

A_1=400(A_1/P, 6%/12, 24). After the first year, what is left to be paid is P=$A_1\left(\frac{P}{A_1},\frac{1}{2}\%,12\right)$.

Then $A_2 = P(\frac{A_1}{P},\frac{3}{4}\%,12)$