FIRST TEST. ECON 235, FALL 2013. NAME: _____

Answer in the space provided. Show correct work for full credit. Box your final answers.

1. Labor supply, part 1: Deriving a labor supply function. Ariel is deciding how much of her time to spend at work. Her preferences over leisure and consumption can be represented by the utility function $U(e,c) = ec^2$, where e is the share of time she spends not working, and c is her consumption, which depends in part on her income from work. To be precise, her consumption is given by $c = w(1-e) + k$, where w is her wage rate, and k is her non-labor income.

1a) On a graph that has e on the horizontal axis and c on the vertical axis (as in part g below), find the slope of Ariel's budget line.

1b) Write an expression for the slope of Ariel's indifference curve at any given e, c combination.

1c) Write an equation indicating that the slope of the budget line and the slope of the indifference curve are the same.

1d) What is the economic intuition behind this? That is, why should these two slopes be equal at Ariel's optimal combination of leisure and consumption?

1e) Use the budget line and the equation from and (1c) to solve for Ariel's utility-maximizing combination of leisure and consumption, as functions of her wage w and her non-labor income k.

2. Labor supply, part 2: Income and substitution effects. We continue with Ariel, from the previous problem. Her utility function and budget constraint are the same, except now we begin to give specific values for w and k.

2a) If Ariel's wage is $w = 60$ and her non-labor income is $k = 30$, how much labor and consumption should she choose?

2b) If Ariel's wage falls to $w' = 30$ and her non-labor income remains at $k = 30$, how much labor and consumption should she choose?

2c) If Ariel's wage is at the lower level of $w' = 30$, find k', the value of non-labor income that makes her original leisure-consumption combination from (2a) just barely affordable.

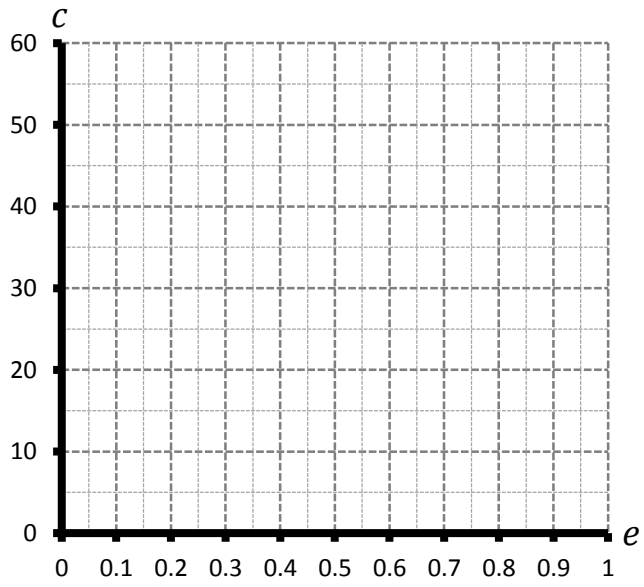
2d) If Ariel has the lower wage $w' = 30$, and non-labor income k' from (2c), how much labor and consumption should she choose?

2e) Based on your answers to (2a), (2b), and (2d), find the numerical values of the substitution effect, income effect and total effect of Ariel's wage changing from $w = 60$ to $w' = 30$, and enter them in the table below. (Be sure to include a minus sign if the effect is negative.)

	leisure	consumption
substitution effect		
income effect		
total effect		

2f) In words, what is meant by the substitution effect? What is meant by the income effect? Explain why the direction (that is, positive vs. negative) of the income and substitution effects you found in (2e) are intuitive.

2g) Graph the budget lines, optimal points, and indifference curves passing through these points, for the situations described in parts (e), (f), and (g).



3. Labor supply, part 3: Labor market participation. One more short question about Ariel. Suppose that she still has the utility function $U(e, c) = ec^2$, and suppose further that her wage and non-labor income are at their original values of $w = 60$ and $k = 30$. Suppose that, as an alternative to working at the wage of 60 while also receiving non-labor income of 30, Ariel has the option of filing an unemployment claim, which generates an income of 10, meaning that she can have a non-labor income of 40 instead of 30 if she doesn't work at all. Does Ariel prefer to work, or to file the claim? Back up your answer with a precise numerical calculation.

4. Labor demand. I own a sandwich shop. The market for sandwiches is perfectly competitive, and the equilibrium price of a sandwich is \$4. The Q column in Table 4a shows the number of sandwiches I can produce if I hire L workers, for values of L from 1 to 7.

4a) Fill in the MP_L column with the marginal product of each worker, the R column with the total revenue given L workers, and the MRP_L column with the L^{th} worker's marginal revenue product.

Table 4a

L	Q	MP_L	R	MRP_L
1				
2				
3				
4				
5				
6				
7				

Table 4b: $w = 150$

TE	FS

Table 4c: $w = 50$

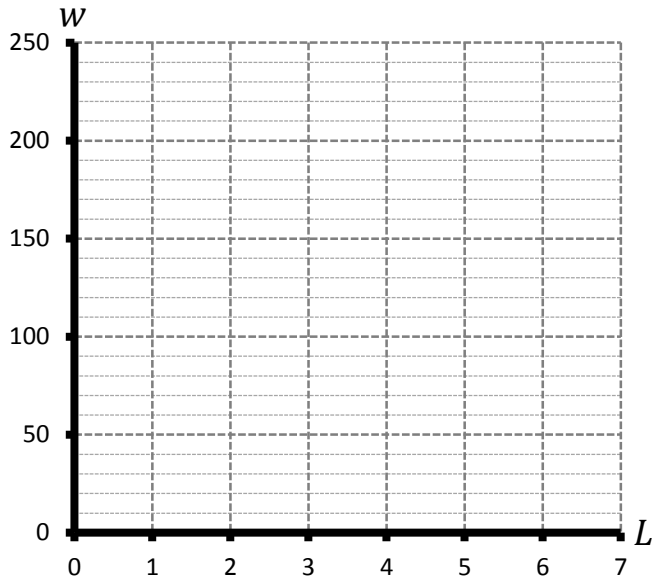
TE	FS

4b) In table 4b, suppose that the going daily wage is \$150. Fill in the TE column with the total expense of hiring L workers, and the FS column with the surplus that I receive if I hire L workers. Supposing that my use of other inputs (e.g. capital) is fixed in the short run, and I want to maximize profit, how many workers should I hire? _____

4c) In table 4c, repeat the exercise from question (4b), but supposing that the wage is \$50. How many workers should I hire in this case? _____

4d) Explain how your answer to (4c) can be reached in two distinct ways given the information in the tables above.

4d) Fill in the blank graph to the right, drawing my labor demand 'curve', which is actually not curved but rather has more of a staircase shape.



5. Equilibrium. In the town of Blargsburg, there are several widget factories, which operate in competitive markets. On aggregate, these factories have the short run production function $Q(L) = 10L - \frac{1}{20}L^2$, where Q is the number of widgets that can be produced per hour, and L is the number of workers employed in a given hour.

5a) Find the marginal product of labor function, $MP_L(L)$

5b) If the price of a widget is \$3, find the marginal revenue product of labor function, $MRP_L(L)$.

5c) Let w be the hourly wage. Find the demand function for widget factory workers, $L_d(w)$.

5d) Suppose that the supply of labor to the Blargsburg widget industry is defined by the marginal cost of labor function $MC_L(L) = 10 + \frac{1}{10}L$, or equivalently by the labor supply function $L_s(w) = 10w - 100$. Find the wage w^*, the number of workers employed L^*, the firm surplus FS, and the worker surplus WS, in the market equilibrium.

5e) Now, find the labor market equilibrium with the same labor demand and labor supply information as above, but with a minimum wage of \$18. Again, we're looking for the wage w^*, the number of workers employed L^*, the firm surplus FS, and the worker surplus WS.

5f) Compare the gain in worker surplus to the loss in firm surplus when this minimum wage is imposed. Explain the economic intuition behind this result as clearly as possible.

5g) On the blank graph to the right, draw the labor market equilibrium with the minimum wage as in problem (5e). That is, draw the demand curve, the labor supply curve, and the minimum wage. Use different colors or patterns to shade the areas corresponding to firm surplus and worker surplus.