Problem set 2, due Tuesday 10/1/13

1. I own a gremlin factory. The market for gremlins is perfectly competitive, and the equilibrium price of a gremlin is \$10. The Q column in Table 1a shows the number of gremlins I can produce if I hire L workers, for values of L from 1 to 7.

a) 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 1a

L	Q	MP_L	R	MRP_L
1	10			
2	19			
3	27			
4	33			
5	37			
6	39			
7	39			

Tab. 1b: $w = 70$

E	S

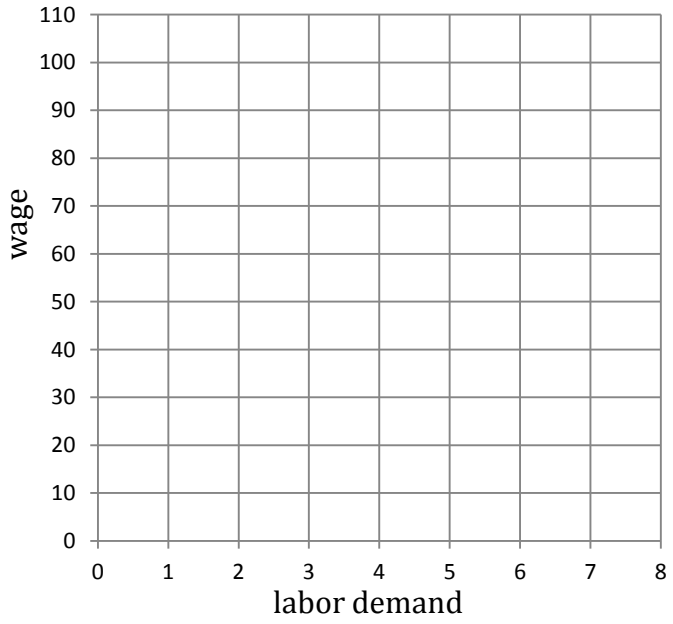
Tab. 1c: $w = 30$

E	S

b) In table 1b, suppose that the going daily wage is \$70. Fill in the E column with the total expense of hiring L workers, and the S 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? _____

c) In table 1c, repeat the exercise from part (b), but with the supposing that the wage is \$30. How many workers should I hire in this case? _____

d) 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.



2. In the town of Blacksburg, there are 10 yogurt factories, which operate in competitive markets. Each yogurt factory has the same short-run production function $Q = 8L - \frac{1}{12}L^2$, where Q is the quantity of yogurt it can produce (in gallons per hour), and L is the number of people it hires in a given hour.

a) For each yogurt factory, the marginal product of labor is given by the function $MP_L =$_____

b) If the price of yogurt is \$3, each factory's marginal revenue product of labor function is $MRP_L =$_____

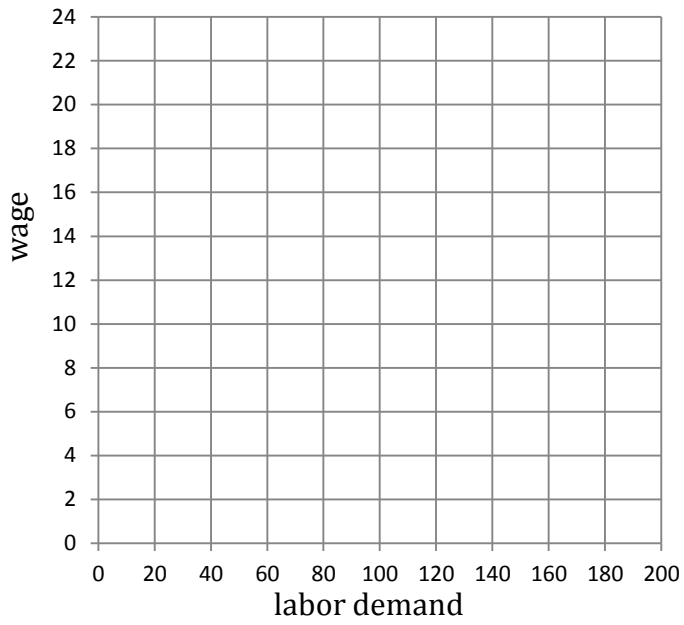
c) Let w be the hourly wage. Each factory's labor demand function is $D_{L_i} =$_____−_____w.

d) The demand for labor function for the 10 factories combines is $D_L =$_____−_____w.

e) Suppose that the supply of yogurt factory labor in Blacksburg is given by the function $S_L = 10w$. The market equilibrium wage is _____, and the number of workers employed per hour is _____. The yogurt factories (collectively) experience a surplus of _____ from this labor market, and the workers (collectively) experience a surplus of _____.

f) If a minimum wage of \$18 is imposed, the equilibrium level of employment is _____, the firms experience a surplus of _____, and the workers experience a surplus of _____. Thus, the minimum wage increases worker surplus by _____, but decreases firm surplus by _____.

g) Fill in the graph to the right to illustrate the situation in part (f), using different colors to indicate worker surplus, firm surplus, and deadweight loss.



3. Experimental / bonus problem. I own a gloop factory. My production function is given by $Q = L^{1/4}K^{1/4}$, where L and K are the amounts of labor and capital I employ, and Q is the amount of gloop I can produce, in tons. If I can sell each ton of gloop for \$160, and both labor and capital cost me \$1 per unit, what are my profit-maximizing values of Q, L, and K?