

Problem Set 3
Due before Lecture 4.

On what and how to submit

- For this and all future problem sets, questions are from the “Problems” section of the questions at the end of the chapter.
- Due before Lecture 4 to Blackboard. See assignment turn-in on course home page.
- Submit a pdf file
- Name the file “ps03-[lastname].pdf”. For example, my file would be “ps03_brooks.pdf”.
- In addition, write your name at the top of the problem set.
- You do not need to type your submission. Any **legible** submission is ok. For example, you can write the problem set with hand-drawn graphs, take a picture, and submit the picture as a pdf.

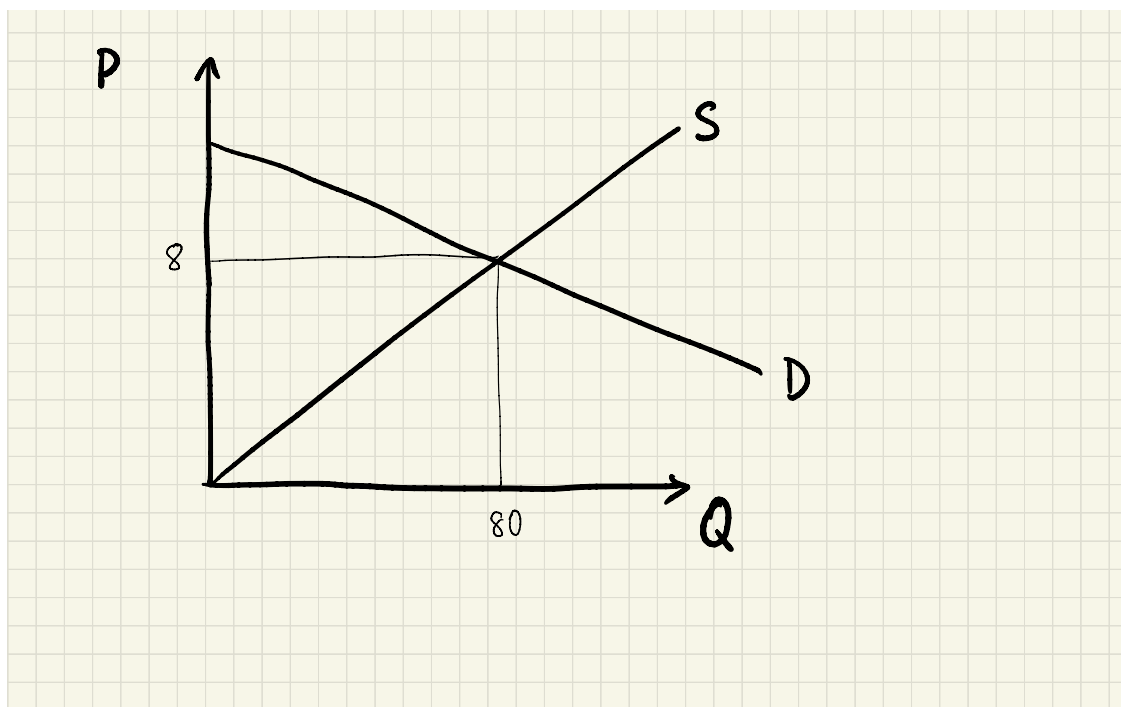
1. GLS Chapter 3, Question 7. **Assume a minimum wage of \$9**, not \$15 as stated in the problem. For (e), use a minimum wage of \$11.

(a) What is the equilibrium wage and quantity of low-skilled labor working in equilibrium?

Find the equilibrium at the intersection of demand and supply:

$$\begin{aligned}Q_S &= Q_D \\10W &= 240 - 20W \\30W &= 240 \\W &= 8\end{aligned}$$

When $W^* = 8$, then find $Q_S = 10(W) = 80$. You can verify that you also find a quantity of 80 using the demand curve.



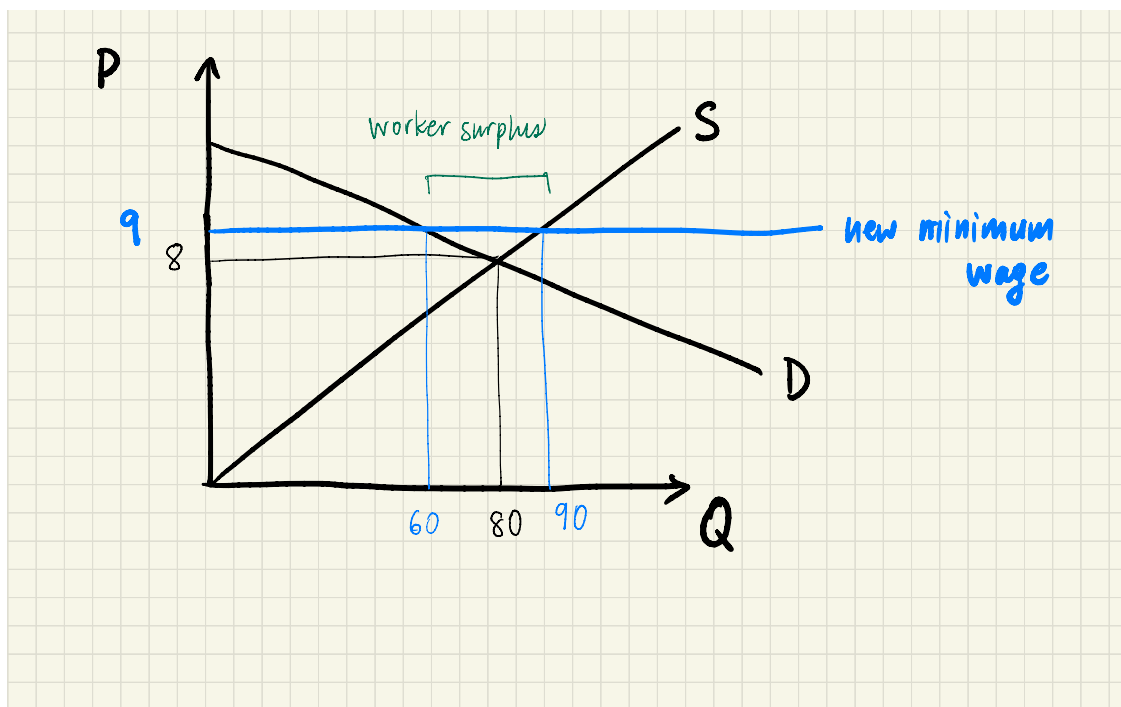
(b) If the government passes a minimum wage of \$9 per hour, what will the new quantity of labor hired be? Will there be an excess supply of labor? How large?

Since this wage is higher than the equilibrium wage, you know in advance that more workers will want work at \$9/hour than there will be employers to hire them.

Mathematically, at a wage of 9, the supply of workers is $Q_S = 10(W) = 90$.

At a wage of \$9, employers want $Q_D = 240 - 20(W) = 240 - 20(9) = 240 - 180 = 60$.

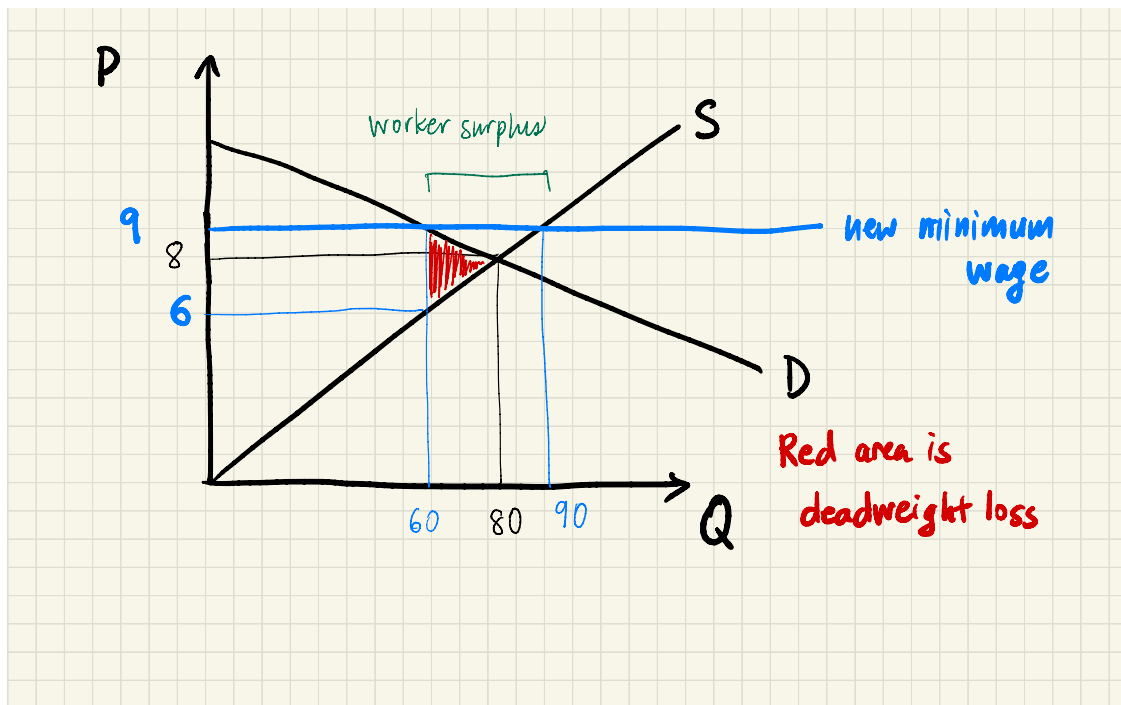
There are 30 more workers who want to work than employers that want to hire them.



(c) What is the deadweight loss of a \$9 minimum wage?

To do this, draw yourself a diagram, like the one at the end of these answers. I know that at a wage of \$9, 60 workers are willing to work. To calculate deadweight loss and all the surplus values, I need to know the wage associated with a quantity of 60 on the supply curve. To this, write $Q_S = 10W$, or $60 = 10W$, or $W = 6$. With these values, I can calculate the area of all the triangles labeled in the first picture.

The deadweight loss is $\frac{1}{2}(3)(20) = 30$.



(d) How much better off does the \$9 minimum wage make low-skilled workers (in other words, how much does producer surplus change), and how much worse off are employers?

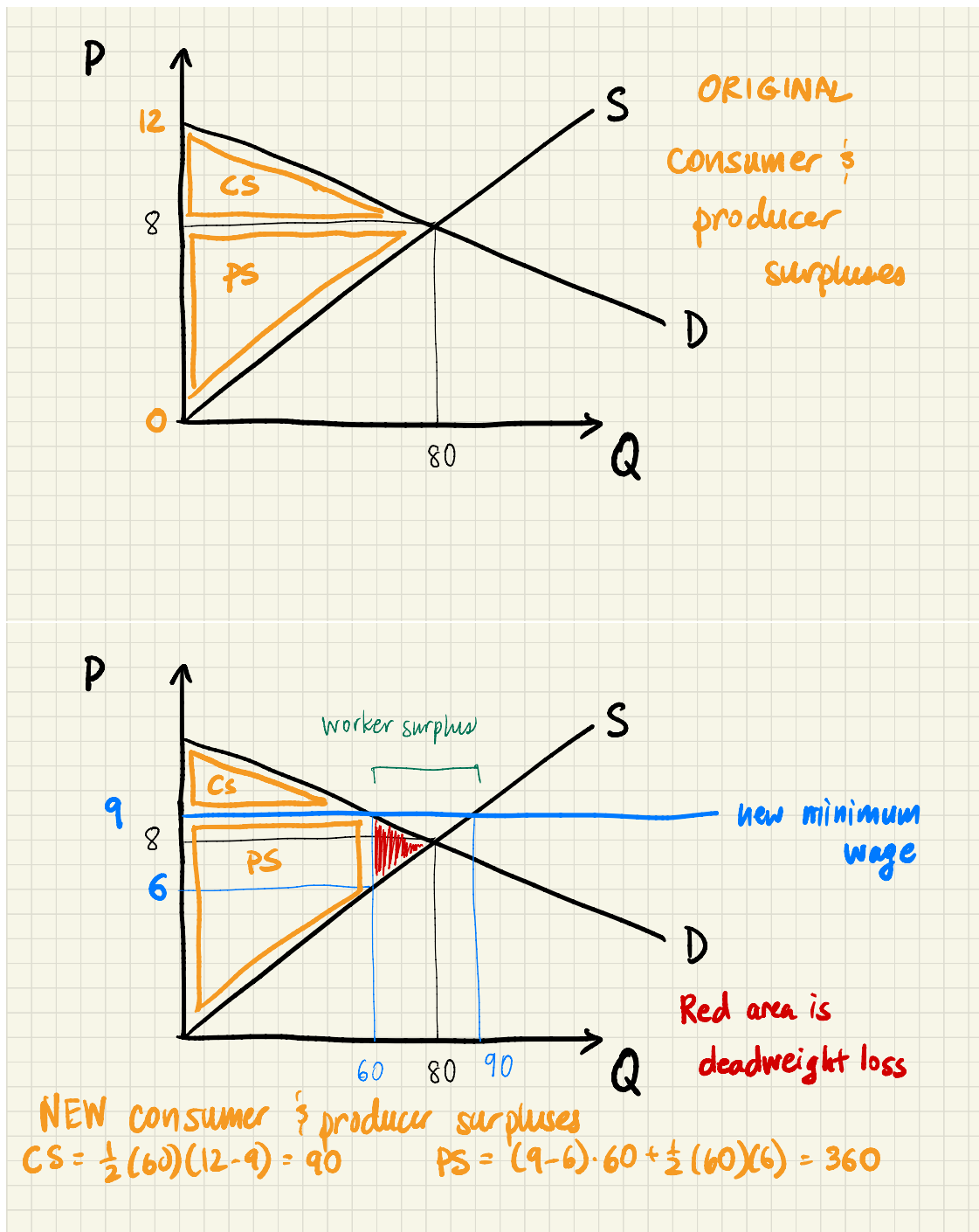
To answer this question, we need to know consumer and producer surplus both before and after the wage change.

Before, consumer surplus is the triangle in the picture below, which is $CS = \frac{1}{2}(4)(80) = 160$. Producer surplus also a triangle in the first picture: $PS = \frac{1}{2}(80)(8) = 320$. (Note that total surplus is $160 + 320 = 480$.)

After, consumer surplus shrinks as show in the second picture below, so $CS = \frac{1}{2}(60)(3) = 90$. Producer surplus changes to a triangle plus a rectangle, so $PS = (60)(2) + \frac{1}{2}(60)(6) + 60 = 120 + 180 + 60 = 360$.

Notice that the new consumer surplus, the new producer surplus and the deadweight loss should equal to the total of consumer and producer surplus before the change.

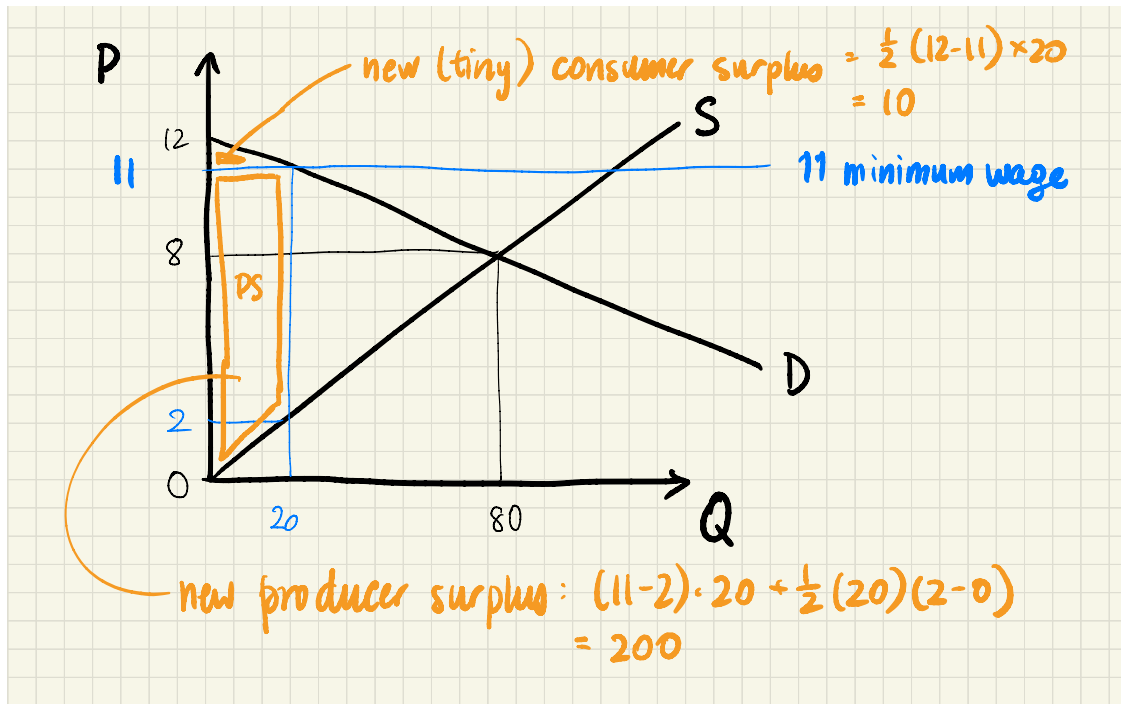
Producer surplus increases by 40. Employers (demanders of labor) have a decrease of 70.



(e) How do your answers to (c) and (d) change if the minimum wage is set at \$11 rather than at \$9?

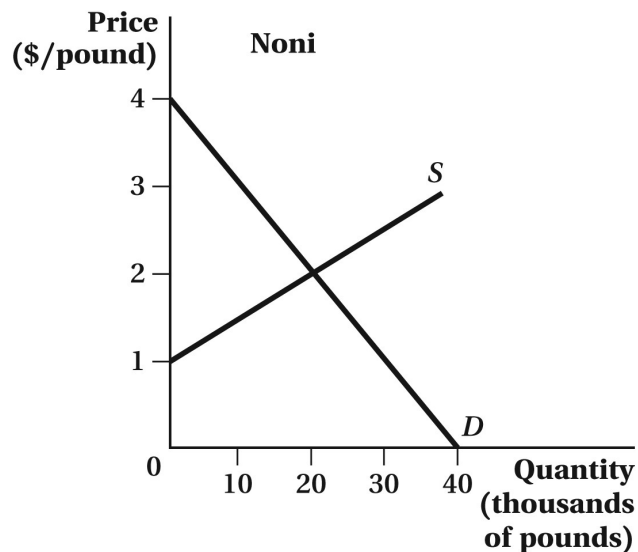
See the figure below. Using the same methods as before, I find that the new consumer surplus is 10. The producer surplus after is a rectangle plus a triangle, totalling to 200. The deadweight loss is 270. (Note that these three total to 480, which is the total surplus before

any changes.)



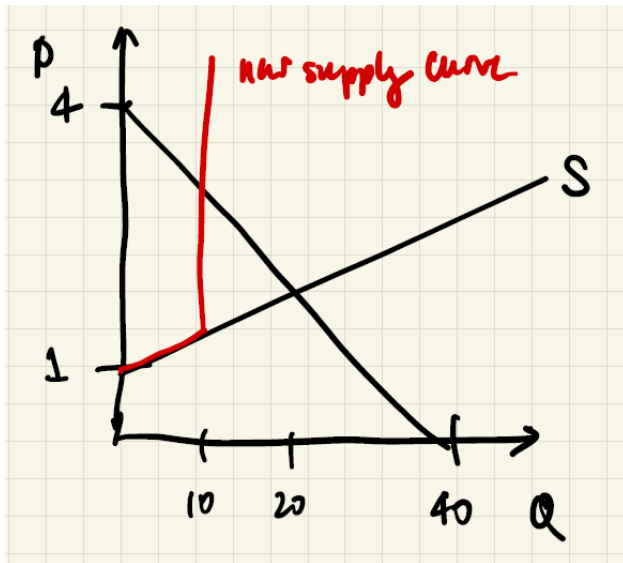
3. GLS Chapter 3, Question 13

Noni is a tropical fruit grown in Hawaii and widely marketed as an herbal cure for various diseases. The market for Noni fruit is depicted in the graph below.



Concerned that Noni fruit may be habit forming and produce adverse side effects, the US Department of Agriculture and the Food and Drug Administration decide to reduce the quantity of Noni available by restriction production to 10,000 pounds monthly.

- a Alter the supply curve to show the impact of the quantity regulation on the market for Noni. Draw the supply curve into the picture; you don't need to write the equation.



- b What will the market price of Noni be after the regulation goes into effect? (Hint: you can use the picture to find the equation for the demand curve.)

First you need to find the equation for the demand curve from the picture. Two points on the curve are $(0,4)$ and $(40,0)$.

We know $y = mx + b$. From $(0,4)$, we know $b = 4$. Now we need to figure out m . Use the other point we didn't already use: $(40,0)$. Plug into $y = mx + 4$.

$$\begin{aligned} y &= mx + 4 \\ 0 &= m(40) + 4 \\ -4 &= 40m \\ m &= -\frac{1}{10} \end{aligned}$$

Putting together, demand curve is $P = -\frac{1}{10}Q + 4$. What is demand where $Q = 10$?

$$\begin{aligned} P &= -\frac{1}{10}Q + 4 \\ &= -\frac{1}{10}(10) + 4 \\ &= -1 + 4 \\ &= 3 \end{aligned}$$

- c What will happen to consumer surplus as a result of the regulation? (Exact numbers not needed – does it increase or decrease?)

Consumer surplus declines – we know that the new market price is where the red supply curve hits the demand curve. A quick look at the figure tells us that this yields a smaller consumer surplus.

- d “We, the producers of Noni fruit, stand united against these intrusive and unnecessary quantity restrictions. Until the dangers of Noni fruit are fully documented, we will fight for the freedom to product all the Noni we want!” Give this public proclamation, do you expect Noni growers to fight hard against these regulations?

No – because producer surplus may have increased. Producers may be getting more surplus, even with the quantity restriction. Also, usually the least profitable firms drop out. Incumbent firms would prefer less competition.

3. Price regulations

Give a specific example of a price ceiling or floor, and not one from class or from the textbook. Roughly, what was the impact of this regulation on quantity supplied and quantity demanded?

Here we accept any reasonably argued answer.