# Assignment 3 Solutions

Gas station labor

You operate a gas station. Your employees could produce coffee for sale by brewing each pot manually; this takes 40 hours of work per week. Your employees could use a super-automatic coffee machine that only requires minimal attention of 10 hours of work per week. Or you could simply not sell coffee.

Suppose that if market wage rate $w \geq 10$, you decide selling coffee is too expensive, so you do not sell coffee whatsoever. If $7 \leq w < 10$, you purchase and use a super-automatic coffee maker. If $w < 7$, you ask your employees to brew pots of coffee individually.

1. Please graph your company's demand curve for *hours of coffee-making labor per week*. Label the horizontal axis with L (hours of labor), using a range from 0 to 200. Label the vertical axis with w (dollars per hour), using a range from 0 to 20. Please label your demand curve as $D_{\text{coffee } L}(w)$.
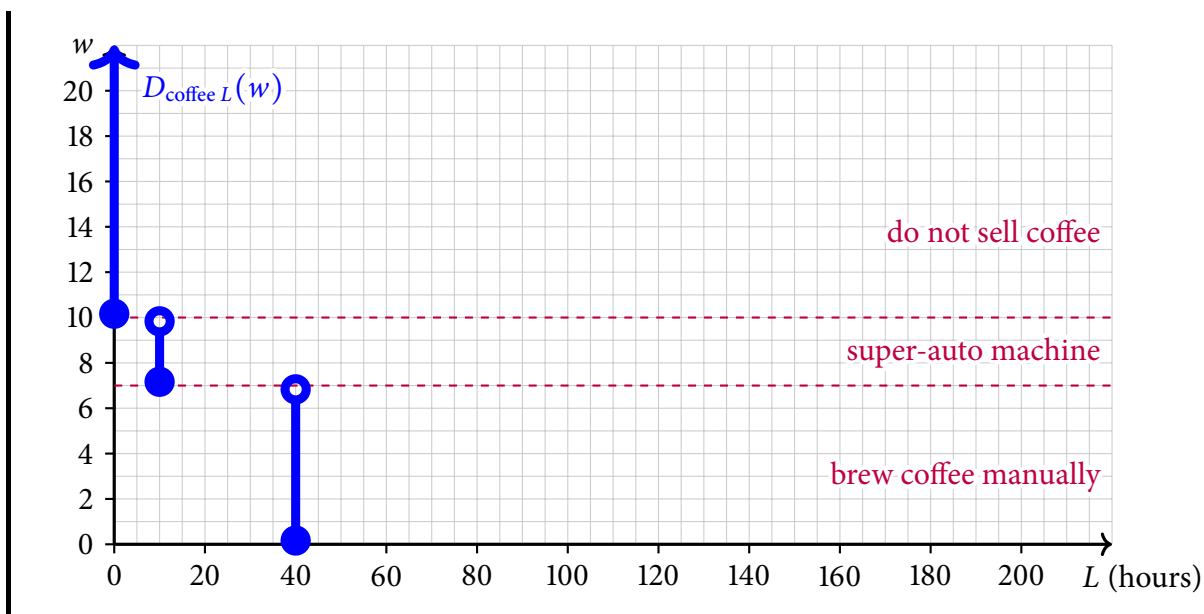
2. Of course, your gas station needs employees to work many other aspects of the station. You need 60 hours of labor per week for cashier work, and you're willing to pay over $20 per hour for this work. Please draw this as a separate curve on the same graph; label this new curve $D_{\text{cashier } L}(w)$.
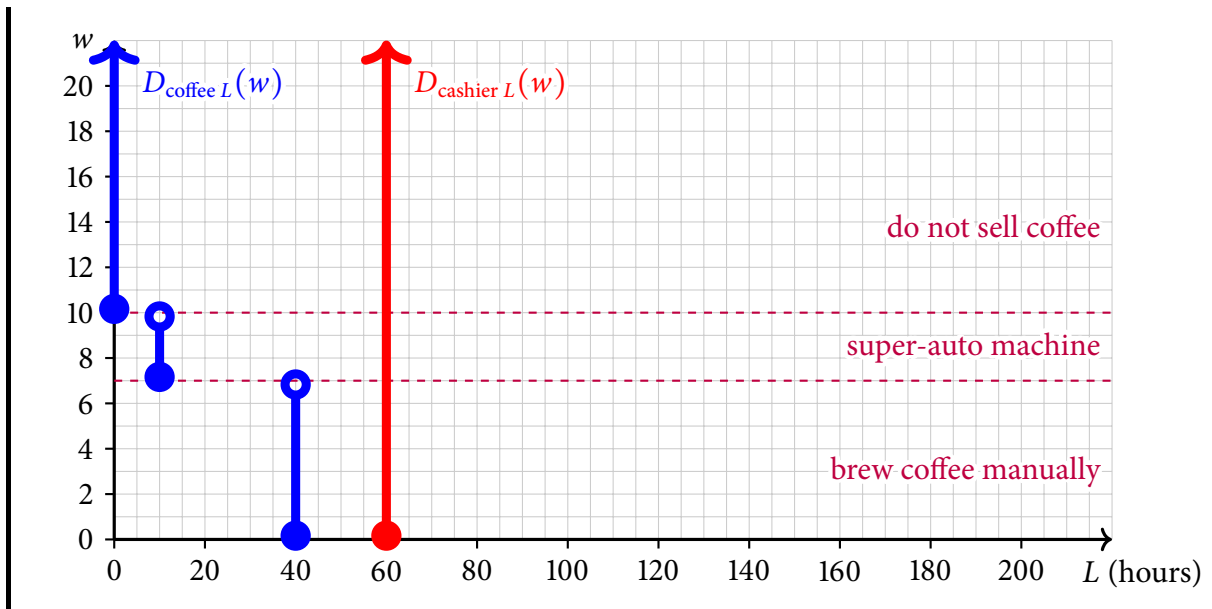

3. On the same graph, please construct a demand curve for the total labor you want to hire $D_{\text{total } L}(w)$ at any given wage w. Note that $D_{\text{total } L}(w) = D_{\text{coffee } L}(w) + D_{\text{cashier } L}(w)$.
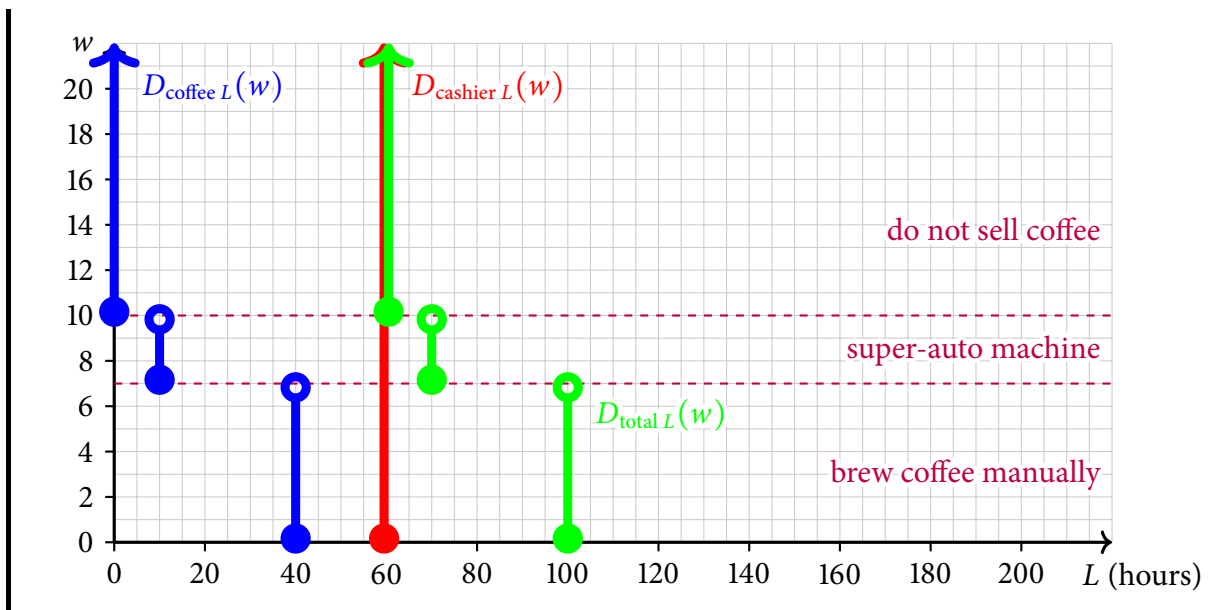
4. Summer arrives and demand for your services doubles. To accommodate this demand, you can exactly double your output by doubling your factor inputs. That is, if you double the amount of labor you hire, you can double the service you provide. Mathematically, $D_{\text{summer total } L}(w) = 2 \times D_{\text{total } L}(w)$. Please add to your graph a curve labeled $D_{\text{summer total } L}(w)$ to represent your total summer labor demand.
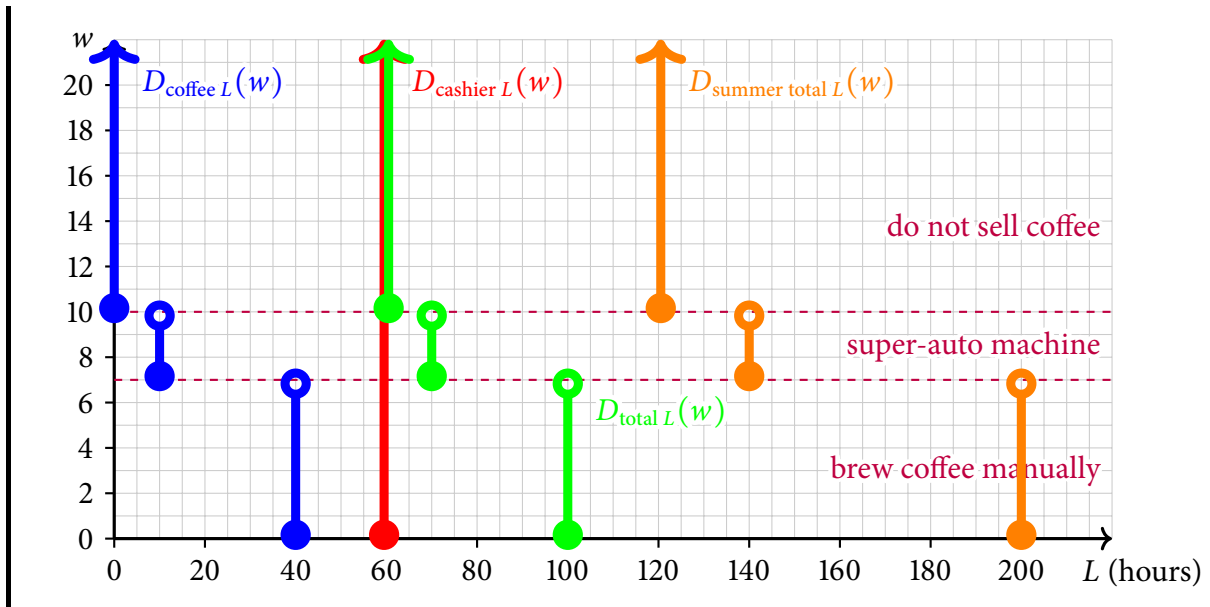
5. Suppose it's summer and the market wage rate is $w = 8$. Mark this point on the demand curve $D_{\text{summer total } L}(w)$ as E. How much labor do you hire? Do you sell coffee, and if so, using what method of production?

I hire 140 hours of labor. I sell coffee that is brewed with a super-automatic machine.
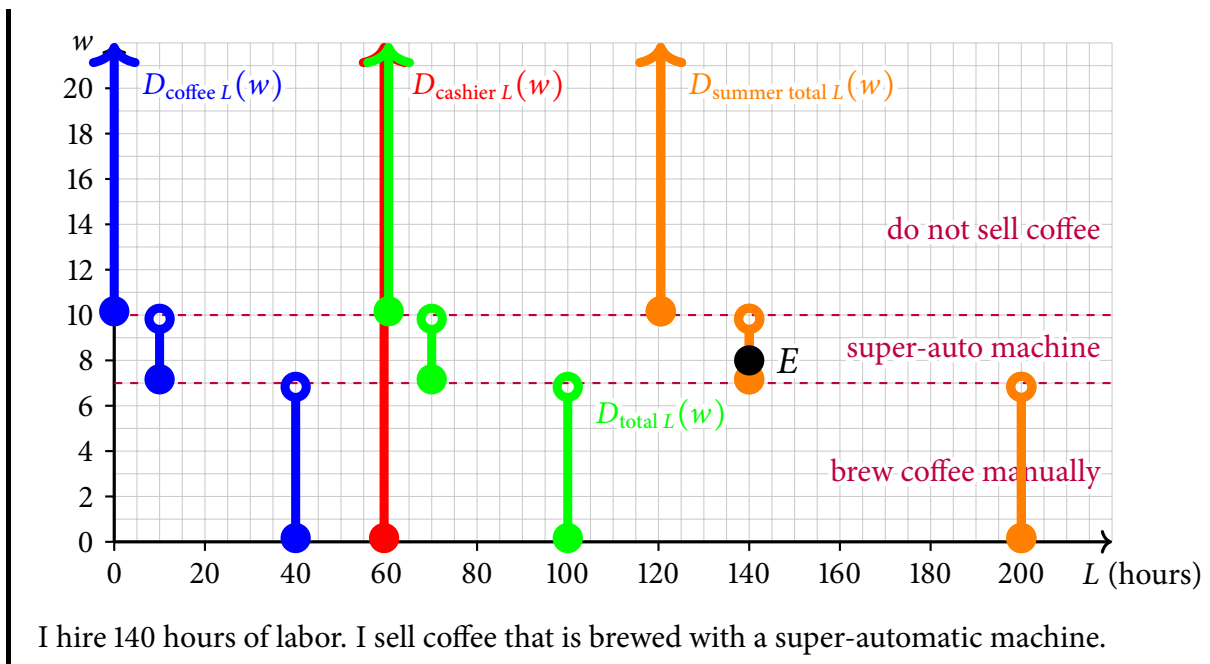
6. Suppose it's summer and the market wage rate is $w = 5$. Mark this point on the demand curve $D_{\text{summer total } L}(w)$ as F. How much labor do you hire? Do you sell coffee, and if so, using what method of production?

I hire 200 hours of labor. I sell coffee that is manually brewed.
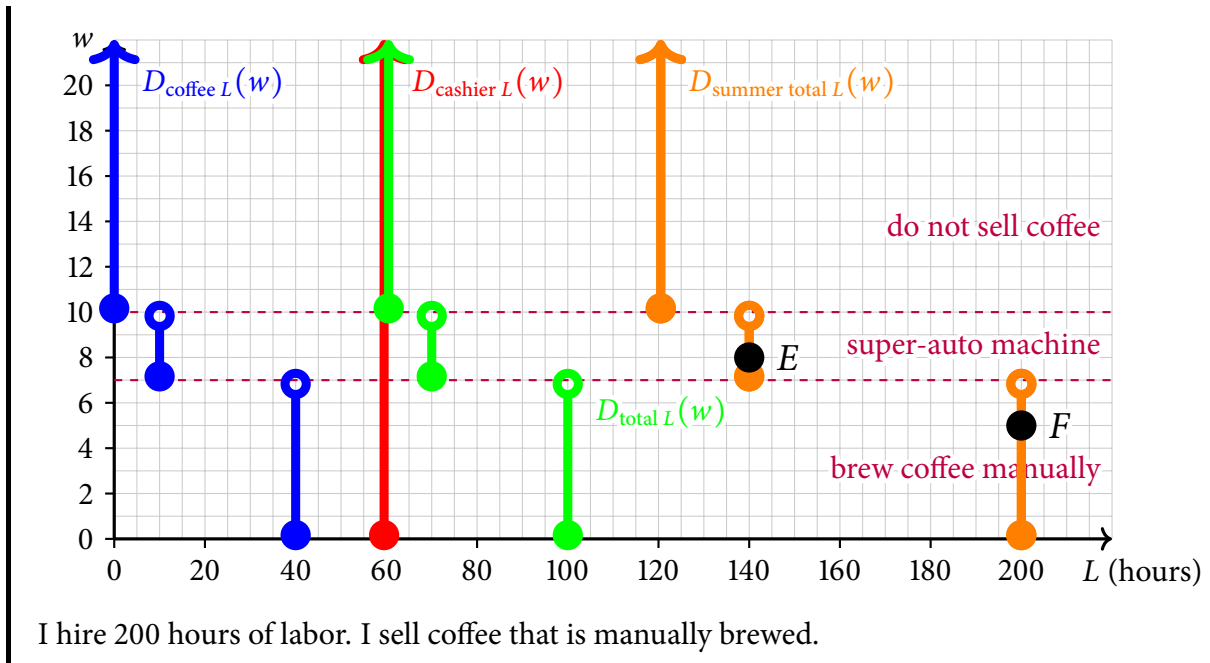
7. Suddenly, many workers have exited the labor force, so market wages have increased—now $10 < w < 20$. Consider how this might affect your demand for summer labor, $D_{\text{summer total } L}(w)$. Does the curve shift? Depict such an example on your graph, label it G, and describe it below.

No curve shifts. This is simply a change in the going wage rate—the market wage, w. Here G depicts how much labor I would hire given a wage rate of $w = 13$.