The Labor Market and Potential GDP

– To understand how potential GDP is determined, we study:
  – The demand for labor
  – The supply of labor
  – Labor market equilibrium
  – Potential GDP
Labor Demand

The business sector in the economy will want to employ more labor so long as the marginal benefit of hiring an additional worker (i.e., the additional output resulting the employment of an additional unit of labor) is greater than the marginal cost of hiring an additional worker (i.e., the real wage rate).

This principle would lead to a downward sloping labor demand curve in which the quantity demanded of labor varies inversely with the real wage rate and shifts in response to changes in the capital stock (K) and technology (A).
Deriving the Labor Demand Curve

How does the amount of output produced by the business sector depend on the amount of labor it employs? How does this depend on the economy’s capital stock and technology?
Real GDP and Employment

– Figure 8.1(a) illustrates a production possibility frontier between leisure time and real GDP.
– The more leisure time forgone, the greater is the quantity of labor employed and the greater is the real GDP.
Real GDP and Employment

- The *PPF* showing the relationship between leisure time and real GDP is bowed-out, which indicates an increasing opportunity cost.

- Opportunity cost is increasing because the most productive
Real GDP and Employment

• The Production Function
  – The production function is the relationship between real GDP and the quantity of labor employed, other things remaining the same.
  – One more hour of labor employed means one less hour of leisure, therefore the production function is the mirror image of the leisure time-real GDP PPF.
Real GDP and Employment

– Figure 8.1(b) illustrates the production function that corresponds to Figure 8.1(a).
– Along the production function, an increase in labor hours brings an increase in real GDP.
Labor Demand and the Production Function

– The demand for labor depends on the **marginal product of labor**, which is the additional real GDP produced by an additional hour of labor when all other influences on production remain the same.

– The marginal product of labor is governed by the **law of diminishing returns**, which states that as the quantity of labor increases, but the quantity of capital and technology remain the same, the marginal product of labor decreases.
The Labor Market and Potential GDP

We calculate the marginal product of labor as the change in real GDP divided by the change in the quantity of labor.
The Labor Market and Potential GDP

- Figure 8.3 shows the relationship between the marginal product of labor curve and the production function.
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- A 100 billion hour increase to 200 billion hours brings a $4 trillion increase in real GDP; labor is $40 an hour.

(a) Calculating marginal product
The Labor Market and Potential GDP

- A 100 billion hour increase to 300 billion hours brings a $3 trillion increase in real GDP; the marginal product of labor is $30 an hour.
- The marginal product of labor is the slope of the production function.
The Labor Market and Potential GDP

- Figure 8.3(b) shows the same information on the marginal product curve, $MP$.
- At 150 (midway between 100 and 200), marginal product is $40$.
- At 250 (midway between 200 and 300), marginal product is $40$. 

(b) The marginal product curve
The Labor Market and Potential GDP

– The marginal product of labor curve is the demand for labor curve with \( \frac{W}{P} \) replacing MP on the vertical axis.

– Firms hire more labor as long as the marginal product of labor exceeds the real wage rate.

– With the diminishing marginal product of labor, the extra output from an extra hour of labor is exactly what the extra hour of labor costs, i.e. the real wage rate.

– At this point, the profit-maximizing firm hires no more labor.
Choose $L$ such that $MPL = w/p$

If $MPL > w/p$, then the additional output obtained from adding labor more than offsets the cost of that additional labor and so profit increases by increasing $L$.

If $MPL < w/p$, then the reduction in output resulting from subtracting labor is more than offset by the reduction in labor costs and so profit increases by decreasing $L$.

Only when $MPL = w/p$ is there no incentive for the profit-maximizing firm to increase or decrease $L$. 
Shifts in Labor Demand

• The labor demand curve will shift if the MPL curve shifts.
• The MPL curve is derived from the production function curve.
• So, the labor demand curve will shift if the production function curve shifts.
• The production function curve shifts if firms can produce more/less output for a given L, which occurs in response to changes in K and/or A.
Shifts in Labor Demand

• The production function ROTATES to the left if K increases and/or A increases and it ROTATES to the right if K and/or A decreases.

• It follows that labor demand increases, i.e., shifts to the right, if K and/or A increases and it decreases, i.e., shifts to the left, if K and/or A decreases.