Economics 102
Summer 2018
Quiz #3 with Answers

Name ANNOTATED KEY

To get full credit on this quiz you must show your work and you must do your work neatly.

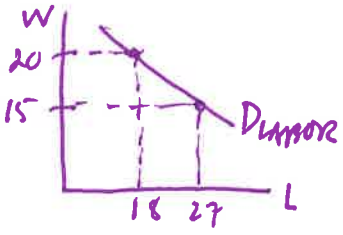
1. You are given the following information about a labor market in an economy. When the wage rate is $20 per unit of labor, 18 units of labor are demanded and when the wage rate is $15 per unit of labor, 27 units of labor are demanded. The labor demand curve is linear. When the wage rate is $2 per unit of labor, 4 units of labor are supplied and when the wage rate is $5 per unit of labor 16 units of labor are supplied. The labor supply curve is linear. Furthermore, the aggregate production function for the economy can be expressed as follows where Y is real GDP, L is the number of units of labor, and K is the number of units of capital:

Aggregate Production Function: $Y = 4K^{1/2}L^{1/2}$

* NOTICE THAT IF K AND L ARE PERFECT SQUARES LIFE WILL BE EASIER!

You are also told that capital is equal to 25 units in this economy.

a. (1 point) Given the above information and holding everything else constant, what is the equation for the demand for labor where W is the wage rate and L is the quantity of labor demanded. Write this equation in slope-intercept form where W is measured on the vertical axis. Show your work for full credit.



$\text{slope} = \frac{\Delta W}{\Delta L} = \frac{-5}{9}$

$y = mx + b$

$W = \left(\frac{-5}{9}\right)L + b$

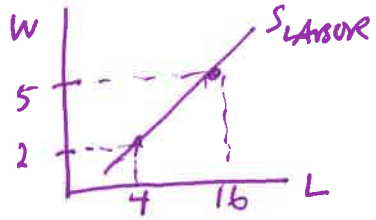
$(L, W) = (18, 20)$ or $(29, 15)$

$20 = \left(-\frac{5}{9}\right)(18) + b$

$30 = b$

LABOR DEMAND: $W = 30 - \left(\frac{5}{9}\right)L$

b. (1 point) Given the above information and holding everything else constant, what is the equation for the supply of labor where W is the wage rate and L is the quantity of labor supplied. Write this equation in slope-intercept form where W is measured on the vertical axis. Show your work for full credit.



$\text{slope} = \frac{\Delta W}{\Delta L} = \frac{3}{12} = \frac{1}{4}$

$y = mx + b$

$W = \left(\frac{1}{4}\right)L + b$

$(L, W) = (4, 2)$ or $(16, 5)$

$2 = \frac{1}{4}(4) + b$

$1 = b$

LABOR SUPPLY: $W = 1 + \left(\frac{1}{4}\right)L$

c. (1 point) Given the above information and holding everything else constant, what is the equilibrium wage rate and the equilibrium quantity of labor for this economy? Show your work.

LABOR DEMAND = LABOR SUPPLY

$30 - \left(\frac{5}{9}\right)L = 1 + \frac{1}{4}(L)$

$(9.4)\left[30 - \left(\frac{5}{9}\right)L = 1 + \frac{1}{4}(L)\right]$

$30(9)(4) - 20L = 36 + 9L$

$1080 - 36 = 29L$

$1044 = 29L$

$L = \frac{1044}{29}$

$L = 36$!

↳ NOTICE THIS IS A PERFECT SQUARE

$30(9)(4) = 270(4)$

$= 1080$

$29\overline{)1044}$ → 36; 87; 174; 174

d. (1 point) What is the level of real GDP, Y, in this economy? Show your work.

$Y = 4\sqrt{K}\sqrt{L}$

$K = 25;\ L = 36$

$Y = 4\sqrt{25}\sqrt{36}$

$Y = 4(5)(6) = 120$

$\boxed{Y = 120}$

e. (1 point) What is the level of capital productivity in this economy? Show your work and make sure your answer includes the units of measurement (no units of measurement-no credit for the answer!). Carry all answers out to at least one place past the decimal.

$\text{CAPITAL PRODUCTIVITY} = \frac{Y}{K} = \frac{120 \text{ UNITS OF OUTPUT}}{25 \text{ UNITS OF CAPITAL}}$

$\boxed{\text{CAPITAL PRODUCTIVITY} = 4.8 \text{ UNITS OF OUTPUT/UNIT OF CAPITAL}}$

$25\overline{)120.0}$ → 4.8, 100, 200

f. (1 point) What is the level of labor productivity in this economy? Show your work and make sure your answer includes the units of measurement (no units of measurement-no credit for the answer!). Carry all answers out to at least one place past the decimal.

$\text{LABOR PRODUCTIVITY} = \frac{Y}{L} = \frac{120 \text{ UNITS OF OUTPUT}}{36 \text{ UNITS OF LABOR}}$

$\boxed{\text{LABOR PRODUCTIVITY} = 3.33 \text{ UNITS OF OUTPUT/UNIT OF LABOR}}$

$36\overline{)120} \Rightarrow 9\overline{)30} \Rightarrow 3\overline{)10}$

2. You have been asked to work on a CPI report. You know that the CPI you are measuring will be measured on a 100 point scale and you know that for purposes of the CPI you are calculating that the market basket is composed of these items: 2 pens, 3 pencils, and 2 mugs. You have been given the following data:

	Price in 2015	Price in 2016	Price in 2017
One pen	y =	$2 per pen	$6 per pen
One pencil	$2 per pencil	x =	$5 per pencil
One mug	$0.50 per mug	$2 per mug	z =

You have also been given the following information:

Year	Cost of Market Basket
2015	$10
2016	$20
2017	$30

a. (1 point) Given the above information and holding everything else constant, fill in the following tables. Show how your found your answer in order to get credit for your answer.

Year	CPI with base year 2016 and measured on a 100 point scale
2015	
2016	
2017	

Year	CPI with base year 2017 and measured on a 100 point scale
2015	
2016	
2017	

$2y + 6 + 1 = 10$

$2y = 3$

$4 + 3x + 4 = 20$

$3x = 12$

$12 + 15 + 2z = 30$

$2z = 3$

$z = \#1.50/\text{mug}$

b. (3 points) Find the values for x, y, and z. Show your work and how you found these values. Enter your final answers in the provided blanks.

x = #4/pencil

y = #1.50/pen

z = #1.50/mug

YEAR	COST OF BASICET	
2015	$2y + 3(2) + 2(.5) = 10$	$\Rightarrow 2y = 3 \Rightarrow y = \#1.50/\text{pen}$
2016	$2(2) + 3(x) + 2(2) = 20$	$\Rightarrow 3x = 12 \Rightarrow x = \#4/\text{pencil}$
2017	$2(6) + 3(5) + 2(z) = 30$	$\Rightarrow 2z = 3 \Rightarrow z = \#1.50/\text{mug}$