

## Mock Exam

*\* This mock exam contains additional practice questions to help students prepare for the multiple-choice section of the exam. In preparation for the long-answer aspect of the midterm, at the end of each chapter is a series of long answer questions specific to each topic that students can review.*

1. Average income increases from 20,000 to 22,000. Quantity demanded per year increases from 5000 to 6000 units. Which of the following is correct?
  - a) Demand is price inelastic
  - b) The good is inferior
  - c) Income elasticity is -2
  - d) The product has a positive income elasticity of demand
2. For a normal good with a downward sloping demand curve:
  - a) The price elasticity of demand is negative; the income elasticity of demand is negative.
  - b) The price elasticity of demand is positive; the income elasticity of demand is negative.
  - c) The price elasticity of demand is negative; the income elasticity of demand is positive.
  - d) The price elasticity of demand is positive; the income elasticity of demand is positive.
3. If a 5 % increase in the price of one good results in a decrease of 2 % in the quantity demanded of another good, then it can be concluded that the two goods are
  - a) Complements
  - b) Substitutes
  - c) Inferior
  - d) Normal

4.

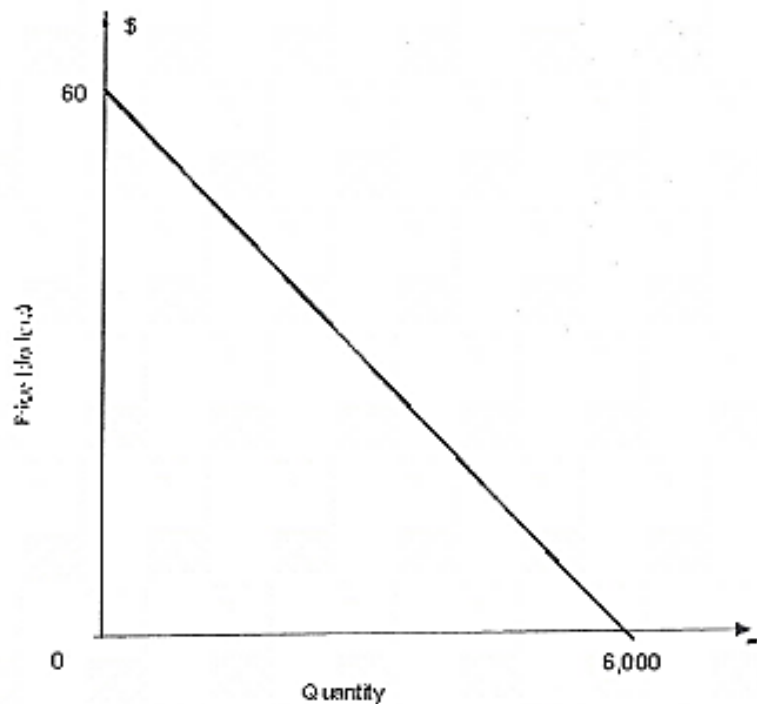
<u>Price</u>	<u>Quantity demanded</u>
\$250	1500
200	2100
150	2700

If price falls from \$ 250 to \$ 200, what is the elasticity of demand ?

- a) -0.67
- b) -1.0
- c) -0.08
- d) -1.5
- e) -2.0



5.



Using the above graph, demand is unit elastic at  $P = \$$  \_\_\_\_\_.

- a) \$ 6.00
- b) \$ 10.00
- c) \$ 20.00
- d) \$ 30.00
- e) \$ 60.00

6. If a price floor above the equilibrium price is imposed by government in a market:

- a) shortages of the commodity will develop.
- b) the quantity demanded will exceed the quantity supplied.
- c) the quantity supplied will exceed the quantity demanded.
- d) the free-market equilibrium price and quantity will still be realized.

7. Which would be an example of a government price ceiling?

- a) limits on interest rates charged by credit card companies
- b) subsidies for apartment rent in major cities
- c) minimum-wage laws for unskilled workers
- d) price supports for agricultural products

8. If demand for farm crops is inelastic, a good harvest will cause farm revenues to:
- a) increase because of the increase in the quantity that farmers can sell.
  - b) increase because of a downward movement along the supply curve, encouraging an increase in demand.
  - c) decrease because of a percentage fall in price greater than the percentage increase in quantity sold.
  - d) remain unchanged, because the increase in quantity that can be sold will be matched by an equal decrease in price.

9. Situation I: After imposing \$10 per-unit sales tax on the producer of product Y, its per unit price increases by \$8.  
 Situation II: After imposing \$10 per-unit tax on the producer of product Y, its per unit price increases by \$6.

This means that product Y in Situation I has a \_\_\_\_\_ elastic supply or has a \_\_\_\_\_ elastic demand.

- a) more ..... more
- b) less..... more
- c) more ..... less
- d) less ..... less

10. From the following demand and supply table of product X., the equilibrium price and quantity transacted of product X are

<b>Unit Price (\$)</b>	1	2	3	4	5	6	7
<b>Quantity Demanded (units)</b>	100	90	80	70	60	50	40
<b>Quantity Supplied (units)</b>	40	50	60	70	80	90	100

- a) \$1 and 40 units respectively.
- b) \$2 and 50 units respectively.
- c) \$3 and 60 units respectively.
- d) \$4 and 70 units respectively.

<b>Unit Price (\$)</b>	1	2	3	4	5	6	7
<b>Quantity Demanded (units)</b>	100	90	80	70	60	50	40

<b>Quantity Demanded (units)</b>	40	50	60	70	80	90	100
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Use the following table for product X to answer questions 11 through 17:

11. When the unit price of product X increases from \$ 1 to \$ 2, its price elasticity of demand is
  - a) Elastic
  - b) Inelastic
  - c) Perfectly inelastic
  - d) Perfectly elastic
  
12. Suppose the government carries out an effective price ceiling control on product X of \$ 3 per unit. Which of the following situations is likely to occur?
  - a) There is an excess supply of 20 units
  - b) There is an excess demand of 20 units
  - c) Quantity supplied increases by 10 units
  - d) The government has a surplus
  
13. Suppose the government sets the minimum price of product X at \$ 2 per unit,
  - a) There will be an excess supply of product X by 40 units
  - b) The consumer of product X will gain the largest benefit
  - c) A shortage of product X will occur
  - d) The equilibrium price of product X will still be at \$ 4
  
14. If the government sets an import quota of product X at 60 units,
  - a) The per unit market price of product X is \$ 5
  - b) The per unit market price of product X is \$ 3
  - c) The quantity supplied of product X is 80 units
  - d) The total market value of product X is \$ 280

15. If the government imposes a \$ 2 per-unit tax to the producer of product X, total sales revenue is
- a) \$ 280
  - b) \$ 300
  - c) \$ 320
  - d) \$ 360
16. Suppose the government imposes a \$ 2 per-unit tax to the producer of product X, the total sales tax burden falling to the sellers is
- a) \$ 50
  - b) \$ 60
  - c) \$ 70
  - d) \$ 80

17. Suppose the government imposes a \$ 4 per-unit subsidy to the producer of product X. Consumers' share of the subsidy is
- \$ 120
  - \$ 140
  - \$ 160
  - \$ 180
18. If the harvest of rice is bad and the price elasticity of demand is inelastic,
- The income of the farmer will decrease
  - The income of the farmer will increase
  - The income of the farmer will remain unchanged
  - There is no relationship between the income of the farmer and price elasticity
19. Suppose the supply of shoes increases. Under which of the following circumstances would the unit price of shoes remain unchanged ?
- Its demand is elastic
  - Its demand is inelastic
  - Its demand is perfectly inelastic
  - Its demand is perfectly elastic
20. If the supply of a certain product increases, under which of the following situations would its price also increase ?
- The demand for its complement decreases
  - The supply of its substitute decreases
  - The price of its substitute decreases
  - Its supply is perfectly inelastic

21. demand function is given by  $Q_d = 500 - 20P$  and the supply function is  $Q_s = 40$ , then the imposition of a per unit tax will cause :
- Consumers to bear a higher tax burden
  - Producers to bear all the tax burden
  - Producers to bear some, but not all the tax burden
  - Consumers and producers to equally share the tax burden
  - The tax burden to be determined by the amount of the tax
22. Suppose labour demand is given by  $L_d = 90 - 2W$  and  $L_s = 10 + 2W$ . If there is a decrease in supply of labour by 10 % and the government holds wages at the original equilibrium, there will be a \_\_\_\_\_ of \_\_\_\_\_ in the labour market.
- Shortage, 5
  - Surplus, 5
  - Shortage, 20
  - Surplus, 20
  - Shortage, 10
23. If the domestic demand is given by  $Q_d = 500 - 20P$  and the domestic supply is given by  $Q_s = 100 + 10P$  and the international supply (world price) is given by  $P = 10$ . What would be the imports with free trade ?
- 0
  - 100
  - 50
  - 200
  - 300
24. Continuing from the previous question, if there was a \$ 2 tariff imposed, what would be the tariff revenue ?
- \$ 80
  - \$ 100
  - \$ 120
  - \$ 140
  - \$ 160
25. Continuing from the previous question, what would be the consumer surplus with the tariff ?
- \$ 1500
  - \$ 1620
  - \$ 1540
  - \$ 1690
  - \$ 1820
26. Continuing from question 23, if there is an import quota of 50 imposed, what would be the world price ?
- \$ 2
  - \$ 13.22
  - \$ 4.44
  - \$ 11.67

27. If unemployment is high and the current wage is above the market clearing level, a reduction in payroll tax will
- a) Increase wages but have little to no effect on employment and unemployment
  - b) Increase employment, reduce unemployment and have little to no effect on wages
  - c) Benefit employers and have no effect on workers
  - d) Be ineffective
28. If a company decides to increase output by 4 units and requires an additional worker to be able to do so, at what price should each unit be sold if the firm wants to break-even. Employees are currently paid an hourly rate of \$ 22.
- a) \$ 5
  - b) \$ 5.50
  - c) \$ 6
  - d) \$ 5.25

29. Use the following data to calculate the unemployment level.

Employment	1 430 200
Labour force participation rate	74.6%
Unemployment rate	8.6 %

The unemployment level is

- a) 1,564,770
  - b) 134,570
  - c) 122,997
  - d) 1,273,565
30. If unemployment is high and the current wage is below the market clearing level, a raise in payroll tax will
- a) Increase wages but have little to no effect on employment and unemployment
  - b) Increase employment, reduce unemployment and have little to no effect on wages
  - c) Benefit employers and have no effect on workers
  - d) Be ineffective



Use the information below to answer the following four (4) questions.

Suppose the market for widgets in a small closed economy is initially characterized by the following domestic demand and domestic supply equations where Q is quantity and P is price.

$$\text{Demand: } Q = 120 - 2P$$

$$\text{Supply: } Q = 4P - 48$$

31. What is the equilibrium price, quantity, consumer surplus & producer surplus in the market for widgets?
- a) \$64, 28, \$512, \$1,024
  - b) \$28, 64, \$2,048, \$1,024
  - c) \$28, 64, \$1,024, \$512
  - d) \$64, 28, \$1,024, \$2,048
32. Suppose demand increases by 12 units at any given price. Holding everything else constant, what is the new value of consumer surplus?
- a) \$1,156
  - b) \$1,296
  - c) \$1,368
  - d) \$2,592
33. Using the original supply and demand given above, now suppose the world price for widgets is \$24. Suppose this small economy opens up its widget market to international trade, but sets an import quota of 12 widgets. What is the new price for widgets in the small economy?
- a) \$22
  - b) \$24
  - c) \$26
  - d) \$28
34. Again, using the original supply and demand given above, now suppose the world price for widgets is \$24. Suppose this small economy instead of implementing a quota implements an import tariff of \$4 to each widget imported. What would be the deadweight loss associated with this tariff as compared to an **open market** for widgets without trade restrictions?
- a) \$48
  - b) \$96

c) \$24

d) \$16

35. Which pays the highest real wage?

- a) Nominal wage \$ 16; CPI 60
- b) Nominal wage \$ 26; CPI 100
- c) Nominal wage \$ 36; CPI 140
- d) Nominal wage \$ 46; CPI 180

36. Which pays the highest real wage?

- a) Nominal wage \$ 18; CPI 60
- b) Nominal wage \$ 28; CPI 100
- c) Nominal wage \$ 38; CPI 150
- d) Nominal wage \$ 48; CPI 185

## LONG ANSWER QUESTIONS

- 1) The domestic demand for lipstick is given by  $Q = 360 - 6P$  and the domestic supply of lipstick is given by  $Q = 6P - 42$ , where  $P$  is the price in dollars per unit and  $Q$  is the quantity in thousands of units. The world price for lipstick is \$ 24.
  - a) Under free trade, what is the quantity of imports ?
  - b) The government now implements an import tariff of \$ 6 to each lipstick imported. What is the quantity of imports ? How much tariff can the government collect ? What is the deadweight loss following the implementation of the tariff ?
  - c) Represent this situation on a graph.

- 2) Suppose the labour supply curve is perfectly elastic at an hourly wage of \$ 10 per hour over the first 300 workers. If more than 300 workers are to be attracted, a wage greater than \$ 10 per hour must be paid. For example, if the wage is \$ 13 per hour, then labour supply is 425 workers. If the wage is \$ 15 per hour, then labour supply is 700 workers.
- a) Draw the labour supply curve described, including the numerical values
  - b) What is the economic rent in the labour market if a wage of \$ 15 per hour is paid and 700 workers are employed?

3) The following are independent scenarios regarding CPI:

**Scenario 1**

A typical household buys 8 books, 3 loaves of bread and 4 apples each week. The prices of these goods in years 2017, 2018 and 2019 are shown in the table below.

Year	Price		
	Book	Bread	Apple
2017	10	3	1
2018	20	6	2
2019	25	6	3

- a) Calculate the CPI in 2019, using 2018 as a base year
- b) Calculate the CPI in 2017, using 2018 as a base year
- c) Calculate the rate of inflation between 2017 and 2018
- d) Calculate the rate of inflation between 2018 and 2019

**Scenario 2**

The retail price for a jar of peanut butter was \$ 3.98 in 2008 and \$ 5.95 in 2018. When 2012 is the CPI base year, the CPI value is 84.8 for 2008 and 117.5 for 2018. Determine the percentage change in real price from 2008 to 2018.

### **Scenario 3**

The average hourly earnings across all employees in either full or part-time time was \$28.92 in 2018 and \$ 21.75 in 2010. The CPI value was 131.9 in 2018 and 108.6 in 2010. Determine the percentage change in real average hourly earnings from 2010 to 2018.

- 4) The production function of Skrachers running shoes can be expressed as  $Q = 30 K^{0.5} L^{0.4}$   
Equipment required for this operation can be rented at \$ 50 per hour and labour can be hired

at \$25 per work hour.

Q = units of Skrachers per month

K = capital input (units of machine hour)

L = labour input (units of worker hour).

a) Find the marginal rate of technical substitution

b) Determine the optimal input mix to produce an output of 2,000 units. Compute the cost of production.

c) Present this situation on a graph

d) If wage costs increase to \$ 30, describe the possible effects this change would have (no computations are required)

5) The following demand and supply functions exist for

$$Q_d = 480 - 9P$$

$$Q_s = 6P$$

a) Find the equilibrium price and quantity

b) Suppose the government introduces a quota of 120 units, what will be the impact on price? Calculate the change in Consumer and Producer Surplus.

c) Calculate the Deadweight Loss.

d) Calculate the new Consumer Surplus

e) Represent this situation graphically.

6) The following demand supply functions have been given :

$$Q_s = 1000 + 50P$$

$$Q_d = 2500 - 25P$$

**Part A**

Assuming that the government implements a subsidy of 5 \$, find the consumer surplus,

producer surplus, cost of the program to the government and the deadweight loss. Show all your results on a graph.

**Part B**

Suppose the government instead introduces a price minimum of 25 \$ and purchases the

excess stock. Determine the total cost of the program to the government, the overall impact to society, and show your results on a graph.

7) The demand and supply of labour are determined by the following equations :



- d) Calculate the arc wage elasticity for demand for labour between the equilibrium and the minimum wages.



# MOCK EXAM SOLUTIONS

## Multiple-Choice Questions

1. D
2. C
3. A
4. D

$$\frac{Y_2 - Y_1}{X_2 - X_1} = \frac{1500 - 2100}{250 - 200} = \frac{-600}{50} = -12$$

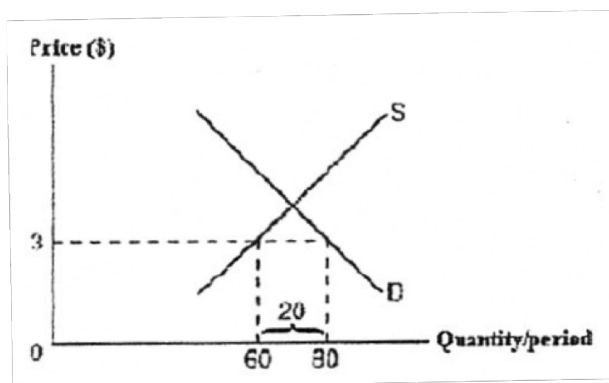
$$E_d = \frac{(\% \Delta Q)}{(\% \Delta P)} = \frac{(\Delta Q)(P)}{(\Delta P)(Q)}$$

$$= -12 \times \frac{[(250+200)/2]}{[(1500+2100)/2]} = -1.5$$

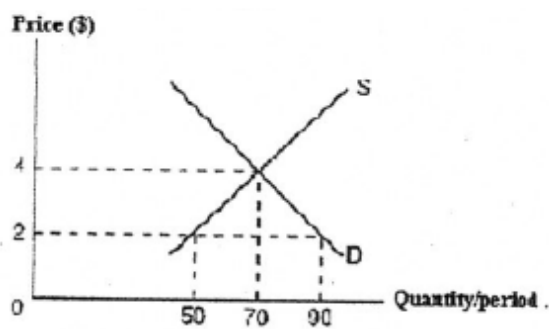
5. D
6. C
7. A
8. C
9. C
10. D
11. B

$$E_d = \frac{90 - 100}{2 - 1} \times \frac{1 + 2}{100 + 90} = -0.16$$

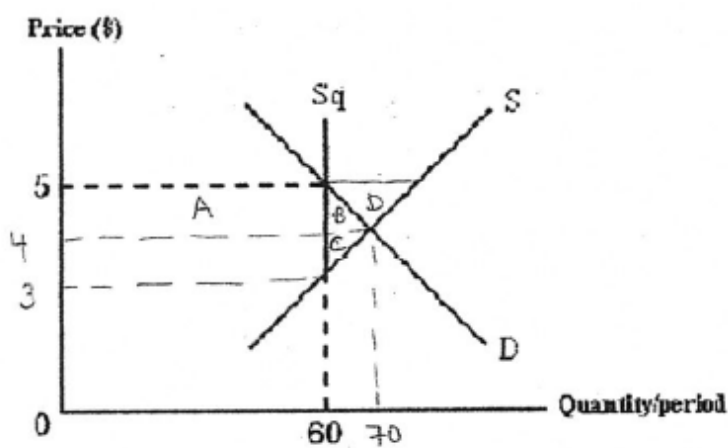
12. B



13. D



14. A



15. B (\$ 5 x 60 units = \$ 300)

16. B (Price new - Price old)/Tax → \$ 1 x 60 units sold = \$ 60

17. D

$$30 + 10(4 + P_b) = 110 - 10 P_b$$

$$30 + 40 + 10 P_b = 110 - 10 P_b$$

$$70 + 10 P_b = 110 - 10 P_b$$

$$20 P_b = 40$$

$$P_b = 2$$

$$P_s = 2 + 4 = 6$$

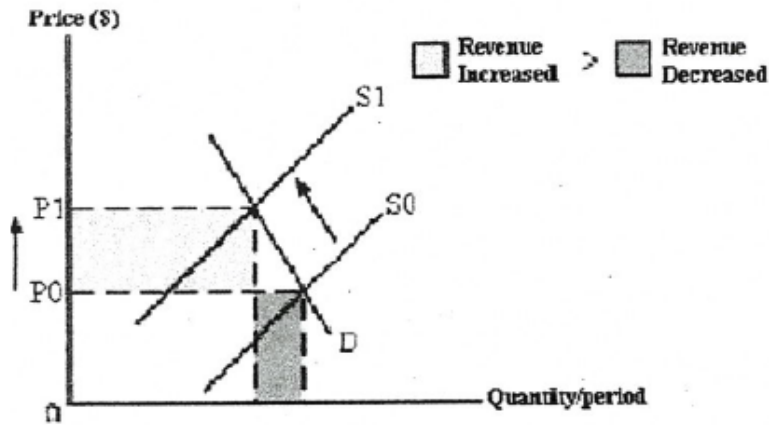
$$\text{New } Q_d = 110 - 10(2) = 90$$

$$\text{New } Q_s = 30 + 10(6) = 90$$

$$\text{Total} = \text{New quantity} \times 2 = 90 \times 2 = 180$$

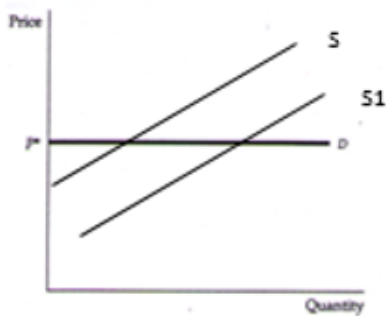
18. B

If demand is inelastic, then as price increases, demand increases by less.



Remember : Only a change in price causes a movement. All other external factors will cause a shift. The harvest for rice being bad causes the supply for this product to shift left.

19. D

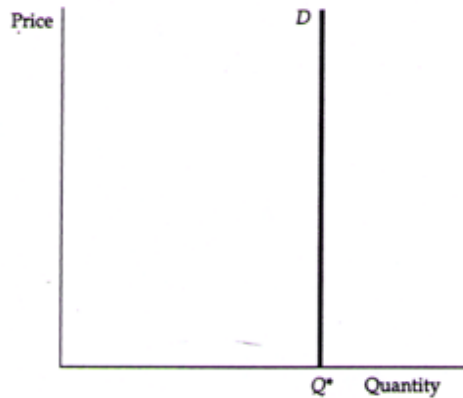


20. B

Both A and C would lead to a decrease in price. D has nothing to do with the change in P.

21. B

$Q_s = 40$ , so supply is perfectly inelastic, which means that producers will continue to produce despite the tax. Producers will bear all the tax burden.



22. A

$$90 - 2W = 10 + 2W$$

$$80 = 4W$$

$$20 = W$$

$$L_d = 90 - 2(20) = 50$$

$$L_s = 0.90(10 + 2w) = 9 + 1.8W$$

$$L_s = 9 + 1.8(20) = 45$$

$$L_d = 90 - 2(20) = 50$$

Shortage of 5

23. B

Free trade means domestic price = world price (so price = 10\$)

$$Q_d = 500 - 20(10) = 300 \quad Q_s = 100 + 10(10) = 200$$

$$\text{Imports} = Q_d - Q_s = 300 - 200 = 100$$

24. A

If a \$ 2 tariff is imposed, price increases to \$ 12. Gov't receives revenue on all imports.

$$\text{Imports} = Q_d - Q_s \quad \text{Tariff Revenue} = (Q_d - Q_s) \times \$ 2$$

Must find new  $Q_d$  and  $Q_s$  when price = \$ 12

$$Q_d = 500 - 20(12) = 260 \quad Q_s = 100 + 10(12) = 220$$

$$\text{Imports} = 260 - 220 = 40$$

$$\text{Tariff Revenue} = 40 \times \$ 2 = \$ 80$$

25. D

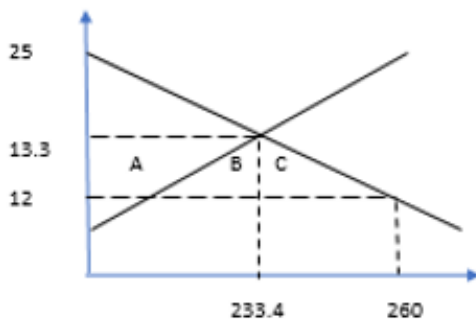
To calculate Consumer Surplus, must go from original price (no free trade) to World Price (with tariff) of \$ 12.

Find the original domestic price

$$\begin{array}{ll} 500 - 20P = 100 + 10P & \text{At this price, } Q = 233.4 \\ 400 = 30P & 500 - 20(13.33) = 233.4 \\ 13.33 = P & 100 + 10(13.33) = 233.4 \end{array}$$

Under the new price of \$ 12,  $Q_d = 260$   
 $500 - 20(12) = 260$

$$\begin{array}{l} \text{Change in consumer surplus} = +A+B+C \\ \frac{(25-12) \times 260}{2} = 1690 \end{array}$$



26. D  
27. B

The cut in payroll tax will cause employees to be less expensive for the employer. As a result, the employer will be willing to hire more workers, which reduces the unemployment level. There will be no effect on wages, because the employee does not receive the payroll tax. The employee simply receives a specific wage per hour.

28. B

Solve through trial and error  
 $\$ 5 \times 4$  new units = 20 \$ vs. higher labour costs of 22 \$  
 $\$ 5.50 \times 4$  new units = 22 \$ vs. higher labour costs of 22 \$ (break-even)

29. B

- **Labour Force Participation Rate = Labour Force/Population**

*We know the Labour Force Participation Rate (74.6 %), but not the other two items*

- **Unemployment Rate = Unemployed/Labour Force**

*Recall that Unemployed = Labour Force - Employed*

See 2<sup>nd</sup> formula in course [pack](#):

*Labour Force = Unemployed + Employed (so just switched it around)*

$$\text{Unemployment Rate} = \frac{\text{Labour Force} - \text{Employed}}{\text{Labour Force}}$$

$$8.6 \% = \frac{\text{Labour Force} - 1,430,200}{\text{Labour Force}}$$

$$0.086 \text{ LF} = \text{LF} - 1,430,200$$

$$0.086 \text{ LF} - \text{LF} = -1,430,200$$

$$-0.914 \text{ LF} = -1,430,200$$

$$\text{LF} = 1,564,770$$

Once we know this, we plug in our known values into the formula

$$\text{Labour Force} = \text{Unemployed} + \text{Employed}$$

$$1,564,770 = \text{Unemployed} + 1,430,200$$

$$\mathbf{134,570 = \text{Unemployed}}$$

30. D

If unemployment is widespread, then workers are not being hired. By raising the payroll tax, this just makes an employee's cost more expensive for the employer. Therefore, this will not entice companies to hire additional workers. As a result, the increase in employment payroll tax will be largely ineffective. Employers will not benefit from this raise because they will now have to remit more taxes to the government on behalf of the employee.

31. C

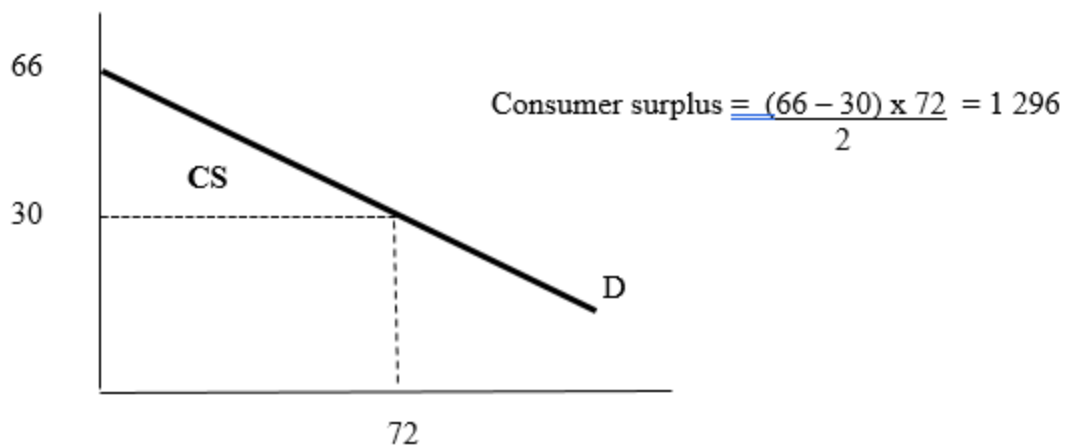
Question is asking for consumer surplus, which means the original amount before any government policy occurred

32. B

$$\begin{aligned}\text{Demand: } Q &= 120 - 2P + 12 \\ &= 132 - 2P\end{aligned}$$

Find new equilibrium price and quantity

$$\begin{aligned}132 - 2P &= 4P - 48 & Q^* &= 4(30) - 48 = 72 & \text{Find intercepts: } 0 &= 132 - 2P \\ 180 &= 6P & & & 66 &= P \\ 30 &= P & & & & \end{aligned}$$



33. C

$$\begin{aligned}\text{Imports} &= Q_d - Q_s \\ 12 &= 120 - 2P - (4P - 48) \\ 12 &= 120 - 2P - 4P + 48 \\ 12 &= 168 - 6P \\ 26 &= P\end{aligned}$$

34. A

35. A

**Real wage = Nominal wage/CPI**

18/60 versus 28/100 versus 38/150 versus 48/185

18/60 gives the highest real wage

## Long Answer Questions

1)

a) Under free trade, the domestic price is ↓ to the world price.

$$360 - 6P = 6P - 42$$

$$360 + 42 = 6P + 6P$$

$$402 = 12P$$

$$33.5 = P$$

$$\begin{aligned} Q_d &= 360 - 6(33.5) \\ &= 159 \end{aligned}$$

$$\begin{aligned} Q_s &= 6(33.5) - 42 \\ &= 159 \end{aligned}$$

With the new price of \$ 24 :

$$\begin{aligned} Q_d &= 360 - 6(24) \\ &= 216 \end{aligned}$$

$$\begin{aligned} Q_s &= 6(24) - 42 \\ &= 102 \end{aligned}$$

$$\text{Imports} = Q_d - Q_s = 216 - 102 = 114$$

b) Import tariff = \$ 6, so new price = \$ 24 + \$ 6 = \$ 30

$$\begin{aligned} Q_d &= 360 - 6(30) \\ &= 180 \end{aligned}$$

$$\begin{aligned} Q_s &= 6(30) - 42 \\ &= 138 \end{aligned}$$

$$\text{Imports} = Q_d - Q_s = 180 - 138 = 42$$

$$\text{Tariff revenue} = \$ 6 \times \text{Imports} = \$ 6 \times 42 = \$ 252$$

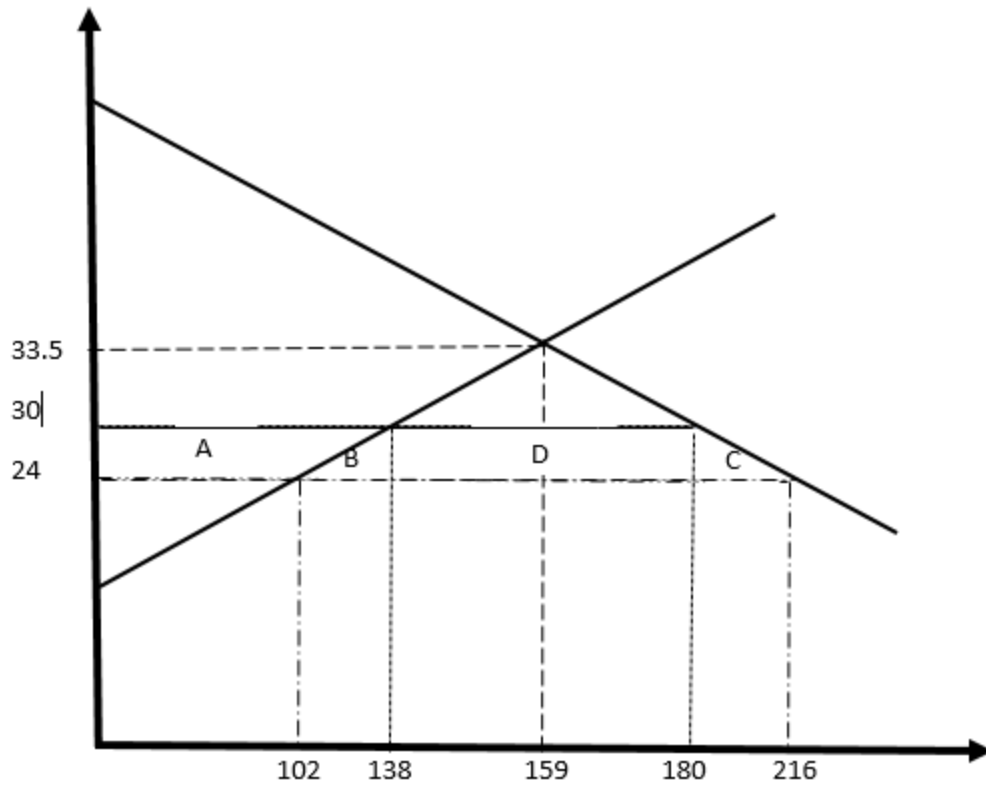
Deadweight Loss :

$$\text{Change in Consumer Surplus} = -A - B - C - D = \frac{(180 + 216) \times (30 - 24)}{2} = - 1188$$

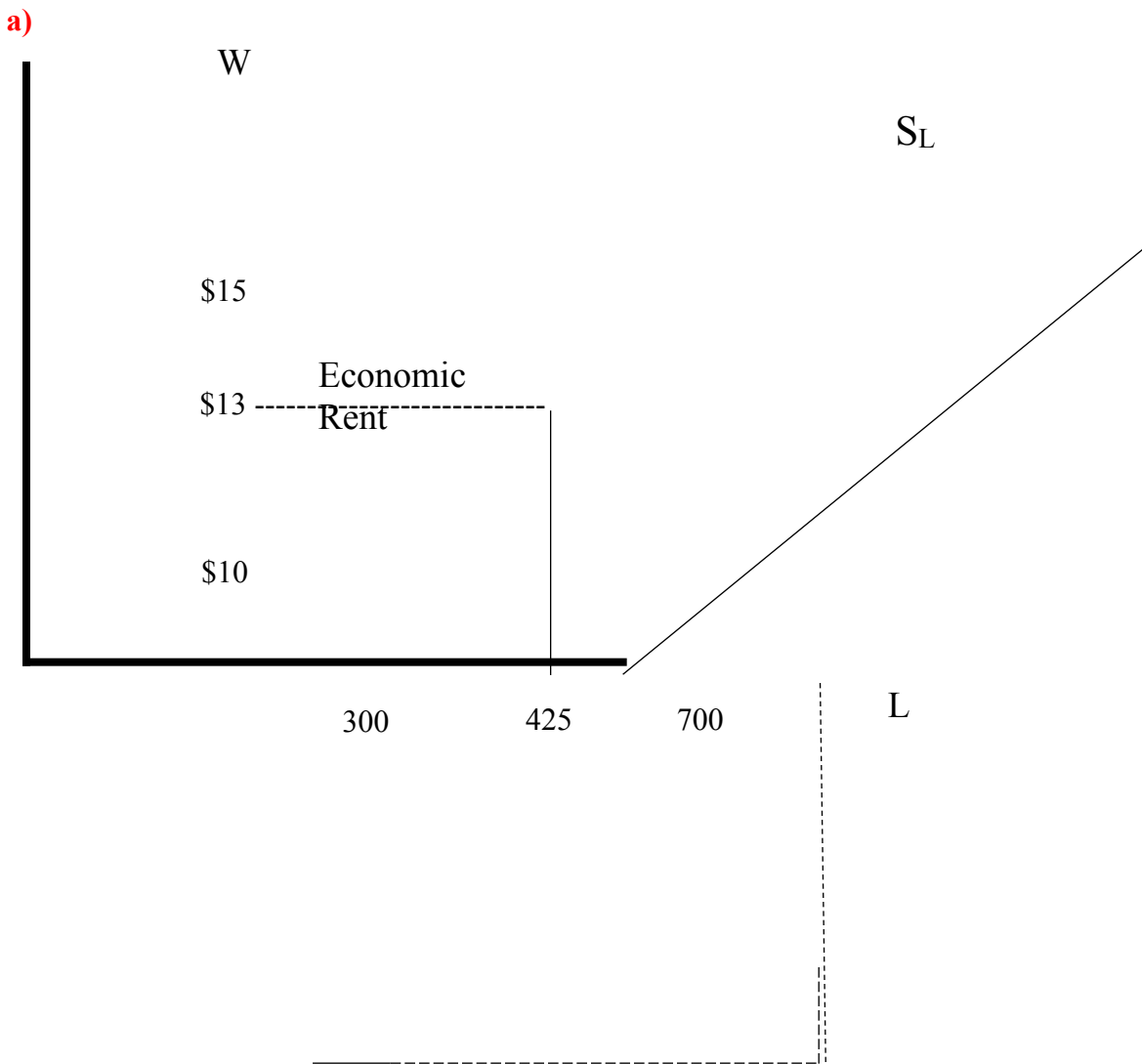
$$\text{Change in Producer Surplus} = +A = \frac{(102 + 138) \times 6}{2} = + 720$$

$$\text{DWL} = 720 - 1188 = - 468$$

c)



2)



b)

$$\text{Economic rent is in the area of a trapezoid: } \frac{(b + B) \times H}{2} = \frac{(300 + 700) \times (15 - 10)}{2} \\ = \$ 2\,500$$

3)

### Scenario 1

Year	Price			Cost of weekly basket	CPI
	Book	Bread	Apple	(# items x price/each)	(Cost in current year/Cost in base year) x 100
2017	10	3	1	$8(10) + 3(3) + 4(1) = 93$	$93/186 \times 100 = 50$
2018	20	6	2	$8(20) + 3(6) + 4(2) = 186$	CPI in base year = 100
2019	25	6	3	$8(25) + 3(6) + 4(3) = 230$	$230/186 \times 100 = 123.66$

- a) CPI in 2017 = 50
- b) CPI in 2019 = 123.66 ~ 124
- c) Rate of inflation =  $(\text{New CPI} - \text{Old CPI}) / \text{Old CPI} \times 100 = (100 - 50) / 50 \times 100 = 100 \%$
- d) Rate of inflation =  $(124 - 100) / 100 \times 100 = 24 \%$

### Scenario 2

CPI in base year = 100

CPI in other years = given (84.8 in 2008 and 117.5 in 2018)

If not given, would have done

CPI = cost in year/cost in base year x 100

Real price = CPI Base/CPI current x Nominal Price current

Real price in 2008:  $100/84.8 \times 3.98 = \$ 4.69$

Real price in 2018:  $100/117.5 \times 5.95 = \$ 5.06$

$$\frac{\$ 5.06 - \$ 4.69}{\$ 4.69} \times 100 = 7.89 \%$$

### **Scenario 3**

Real wage = Nominal wage/CPI

*(students can x by 100 if they choose. End answer will be the same)*

2010 :  $\$ 21.75/108.6 = 0.2003$

2018 :  $\$ 28.92/131.9 = 0.2193$

$$\frac{\text{New wage} - \text{Old wage}}{\text{Old wage}} \times 100 = \frac{0.2193 - 0.2003}{0.2003} \times 100 = 9.48 \%$$

4)

$$\begin{aligned} \text{a) MP Labour} &= 30 K^{0.5} L^{0.4} \\ &= 0.4 (30) K^{0.5} L^{0.4-1} \\ &= 0.4 (30) K^{0.5} L^{-0.6} \end{aligned}$$

$$\begin{aligned} \text{MP Capital} &= 30 K^{0.5} L^{0.4} \\ &= 0.5(30) K^{0.5-1} L^{0.4} \\ &= 0.5 (30) K^{-0.5} L^{0.4} \end{aligned}$$

$$\text{MRTS} = \frac{\text{MP Labour}}{\text{MP Capital}} = \frac{0.4 (30) K^{0.5} L^{-0.6}}{0.5 (30) K^{-0.5} L^{0.4}} = \frac{0.8 K^1}{L^1} = -0.8 \frac{K}{L}$$

b)  $\frac{0.8 K}{L} = \frac{25}{50}$  (cross multiply)

$$L = 50$$

$$0.8 K(50) = 25 L$$

$$40 K = 25 L$$

$$1.6K = L$$

Plug into Q equation because we are given the units of production. We have not been given the total cost (budget).

$$2000 = 30K^{0.5}(1.6K)^{0.4}$$

$$\frac{2000}{30} = K^{0.5} 1.6^{0.4} K^{0.4}$$

$$66.67 = 1.2068 K^{0.9}$$

$$55.24 = K^{0.9}$$

$$(55.24)^{(1/0.9)} = K$$

$$\underline{\underline{86.27 \text{ units} = K}}$$

To find L, take  $1.6K = L$  and plug in  $K = 86.27$  units

$$\underline{\underline{L = 1.6(86.27) = 138 \text{ units}}}$$

To find the cost of production:

$$B = wL + cK$$

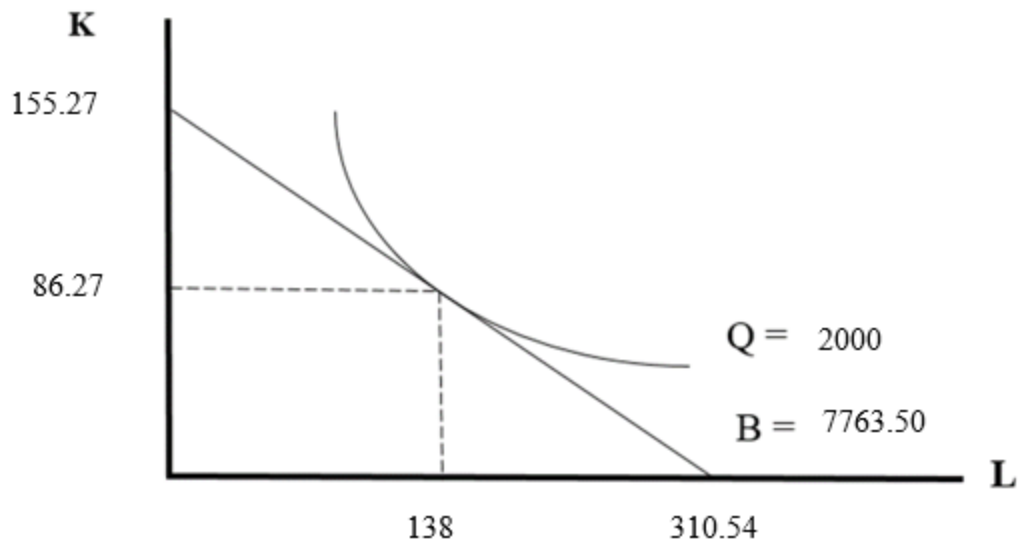
$$B = 25(138) + 50(86.27) = \underline{\underline{\$ 7,763.50}}$$

c)

To find intercepts :

$$\frac{\text{Budget}}{W} = \frac{7763.50}{25} = 310.54$$

$$\frac{\text{Budget}}{C} = \frac{7763.50}{50} = 155.27$$



d)

Scale Effect (Short-term effect)	Substitution Effect
When Wages ↑, costs of inputs ↑, which results in higher production costs	When Wages ↑, we want to substitute the two inputs by adding more capital (K) and ↓ use of labour (L)
<b>Total Budget will be held constant (remain the same)</b>	<b>Units produced will be held constant (remain the same)</b>
<b>To compensate, units products will ↓ (the scale of our production will ↓)</b>	Because it is more expensive to produce (since W went up), if we want to keep the same units of production, <b>Total cost of production (Budget) will ↑</b>
New optimal input mix will look as follows :  <ul style="list-style-type: none"> <li>- Will be situated on a lower isoquant (because units = smaller)</li> <li>- Quantity of Labour demanded will ↓</li> <li>- Quantity of Capital demanded will stay the same (in the short term, capital remains fixed)</li> <li>- Will be located on the same budget line as original, except that it will be pivoted to consider a change in slope (w/c is no longer the same)</li> </ul>	New optimal input mix will look as follows :  <ul style="list-style-type: none"> <li>- Will be situated on original isoquant (because units = same)</li> <li>- Quantity of Labour demanded will ↓</li> <li>- Quantity of Capital demanded will ↑</li> <li>- Will be located on a new higher budget line that is parallel to the pivoted one drawn under the scale effect</li> </ul>

5)

a)  $480 - 9P = 6P$

$480 = 15P$

$32 = P$

$Q_d : 480 - 9(32) = 192$

$$Q_s : 6(32) = 192$$

- b) The limited quantity will cause price to increase

$$Q_d : 480 - 9P = 120, \text{ isolate } P. \quad P = 40$$

Change in Consumer Surplus : - **A** - **B**

$$\frac{(b + B) \times H}{2} = \frac{(120 + 192) \times (40 - 32)}{2} = \underline{\underline{-1872}}$$

Change in Consumer Surplus : + **A** - **C**

$$A : (B \times H) = 120 \times (40 - 32) = 1440$$

$$C : (B \times H)/2 = [(192-120) \times (32-20^*)]/2 = -432$$

$$\text{Change} = 1440 - 432 = \underline{\underline{1008}}$$

\*Find P when  $Q_s = 120$

$$120 = 6P$$

$$20 = P$$

- c) Overall impact: - **B** - **C**

Because we just calculated the change in consumer and producer surplus, the deadweight loss is essentially the difference between the two

$$- \quad 1872 + 1008 = \underline{\underline{-864}}$$

- d) New Consumer Surplus = Original Consumer Surplus + Change in Consumer Surplus  
To find Original consumer surplus, need point of intersection :

When  $Q_d = 0$ ,  $P = ?$

$$0 = 480 - 9P$$

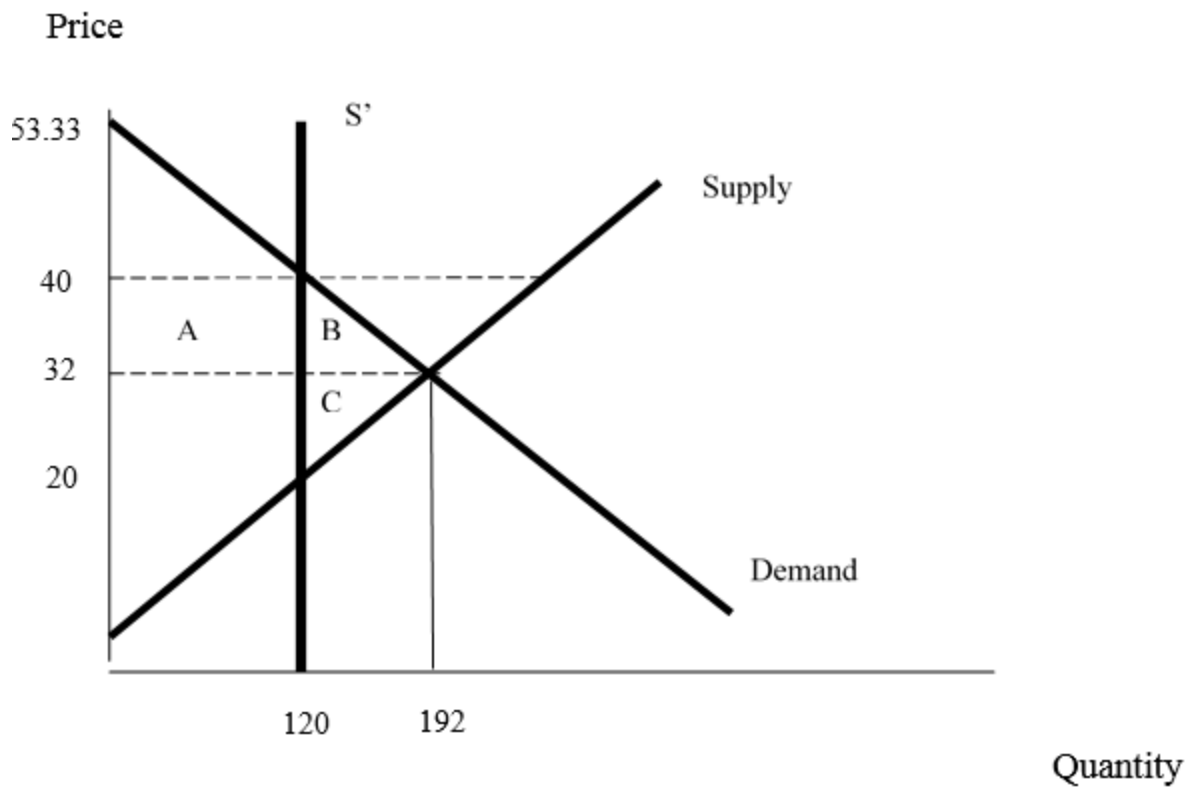
$$-480/-9 = P$$

$$53.33 = P$$

$$\text{Original consumer surplus} = \frac{B \times H}{2} = \frac{(53.33 - 32) \times 192}{2} = 2048$$

$$\text{New Consumer Surplus} = 2048 + - 1872 = \underline{\underline{176}}$$

e)



5) **Part A**

Find equilibrium point:

$$1000 + 50 P = 2500 - 25 P$$

$$75 P = 1500$$

$$P = 20$$

$$1000 + 50(20) = 2000$$

$$2500 - 25(20) = 2000$$

$$P^* = 20 \quad Q^* = 2000$$

Find points of intersection:

**Let  $Q_d = 0$**

$$0 = 2500 - 25P$$

$$100 = P$$

intercept)

**Let  $Q_s = 0$**

$$0 = 1000 + 50P$$

$20 = P$  (because P is negative, will have to find another

Let P on supply curve = 0

$$Q_s = 1000 + 50(0) = 1000$$

A subsidy causes  $P_b$  to be lower and  $P_s$  to be higher. We must find these prices:

$$P_b = P_s - \text{Subsidy} = P_s - 5 \text{ (plug into the demand equation)}$$

$$Q_d = 2500 - 25 P$$

$$Q_d = 2500 - 25(P_s - 5)$$

$$Q_d = 2500 - 25P_s + 125$$

$$Q_d = 2625 - 25P_s$$

Now set the new  $Q_d$  function equal to the  $Q_s$  function to find  $P_s$

$$2625 - 25P_s = 1000 + 50P_s$$

$$1625 = 75P_s$$

$$21.67 = P_s$$

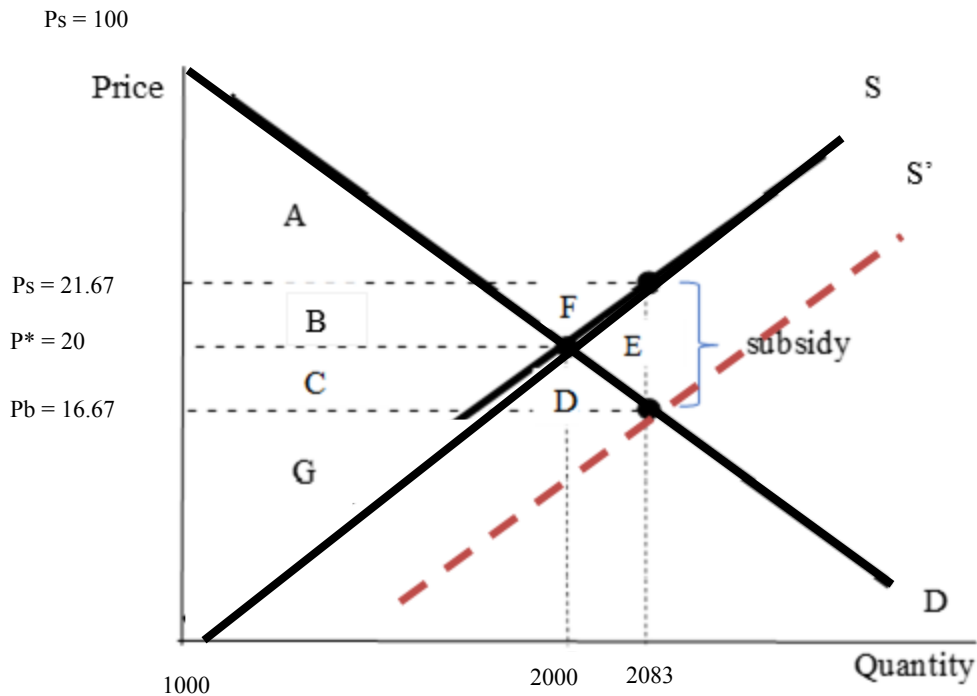
To find  $P_b$  :

$$P_b = P_s - \text{Subsidy} = P_s - 5 = 21.67 - 5 = 16.67$$

Find new quantity:

$$Q_d = 2500 - 25(16.67) = 2083$$

$$Q_s = 1000 + 50(21.67) = 2083$$



Consumer Surplus (A + B) :

$$\frac{B \times H}{2} = \frac{2000 \times (100 - 20)}{2} = 80\,000$$

Producer Surplus (C + G) :

$$\frac{(b + B) \times H}{2} = \frac{(1000 + 2000) \times 20}{2} = 30\,000$$

$$\text{Cost to government} = \text{Subsidy} \times \text{new quantity} = \$ 5 \times 2\,083 = \$ 10\,415$$

DWL (E) :

$$\frac{(B \times H)}{2} = \frac{(2083 - 2000) \times (21.67 - 16.67)}{2} = -207.5$$

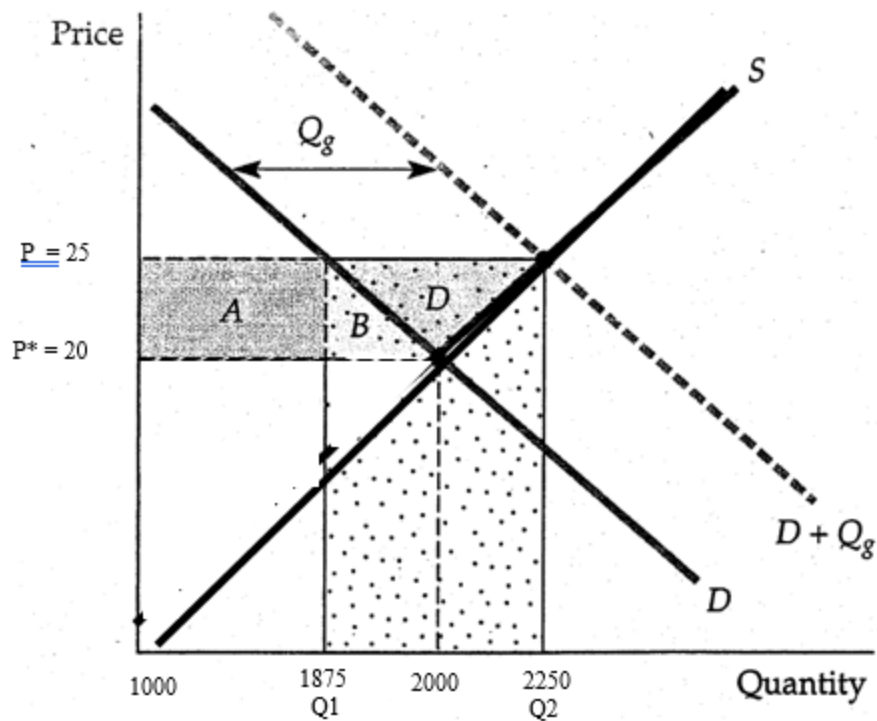
### Part B

$$P^* = 20 \quad Q^* = 2000$$

New price = 25, must find  $Q_d$  and  $Q_s$  at this new price

$$\begin{aligned} Q_d &= 2500 - 25P \\ &= 2500 - 25(25) \\ &= 1875 \end{aligned}$$

$$\begin{aligned} Q_s &= 1000 + 50P \\ &= 1000 + 50(25) \\ &= 2250 \end{aligned}$$



$$\text{Change in Welfare} = D - (Q_2 - Q_1) P_s$$

$$D : \frac{(2250 - 1875) \times (25 - 20)}{2} = 937.5$$

$$\text{Cost to Government} = (Q_2 - Q_1) \times P_s = (2250 - 1875) \times \$ 25 = \underline{\underline{\$ 9\,375}}$$

$$\text{Total impact to society} = 937.5 - 9\,375 = \underline{\underline{-8\,437.5}}$$

6)

$$L_d = 5400 - 250 W$$

$$L_s = -1800 + 300 W$$

a)

$$5400 - 250 W = -1800 + 300 W$$

$$5400 + 1800 = 300 W + 250 W$$

$$7200 = 550 W$$

$$\underline{\underline{13.09 = W^*}}$$

$$L_d = 5400 - 250(13.09) = \underline{\underline{2127}}$$

$$L_s = -1800 + 300(13.09) = \underline{\underline{2127}}$$

b) If the government introduces a minimum wage of \$ 14, calculate the deadweight loss

Find the new  $L_d$  and  $L_s$  when  $w = 14$

$$L_d = 5400 - 250(14) = 1900$$

$$L_s = -1800 + 300(14) = 2400$$

$$DWL = -B - C = \frac{(14 - 12.33) \times (2127 - 1900)}{2} = \underline{\underline{-189.55}}$$

c)

Find intercepts :

$$\text{Let } L_d = 0$$

$$0 = 5400 - 250 W$$

$$\text{Let } L_s = 0$$

$$0 = -1800 + 300 W$$

$$21.6 = W$$

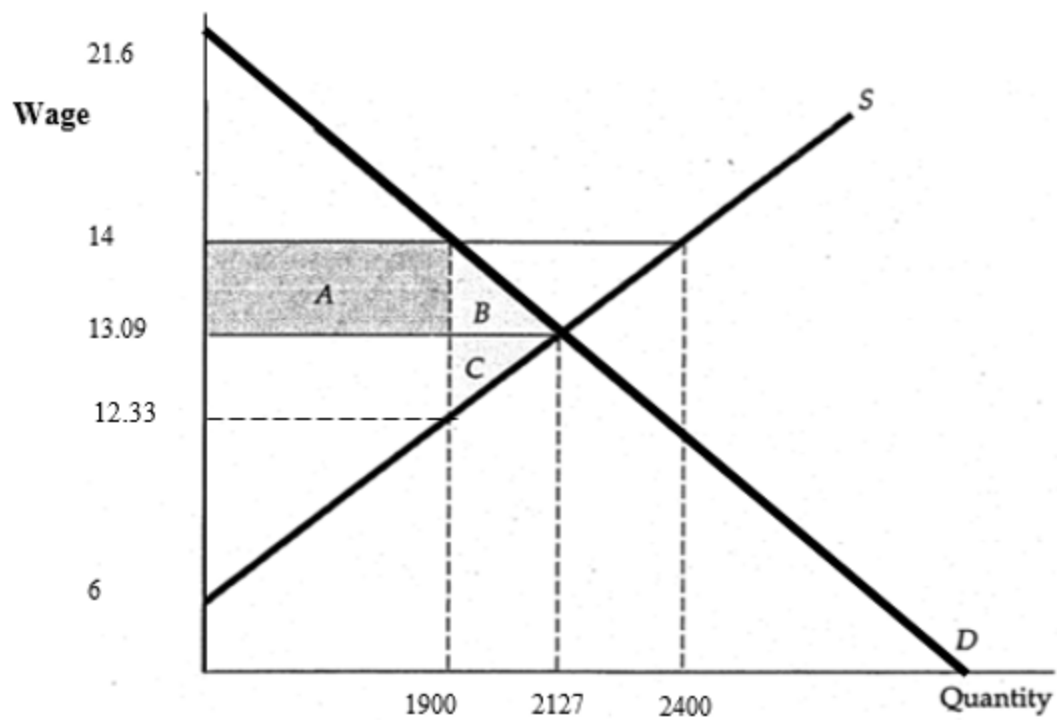
$$6 = W$$

Find wage when  $L_s = 1900$  :

$$1900 = -1800 + 300W$$

$$3700 = 300W$$

$$12.33 = W$$



d)

$$L_d = 5400 - 250W$$

$$E_d = \frac{(\Delta Q)}{(\Delta P)} \times \frac{[(P_1 + P_2)/2]}{[(Q_1 + Q_2)/2]}$$

$$= -250 \times \frac{(13.09 + 14)}{2}$$

$$\begin{aligned} & (2127 + 1900)/2 \\ & = -250 \times \frac{13.545}{2013.5} \\ & = \underline{\underline{-1.6818}} \end{aligned}$$

Ld when  $W = 13.09$  is 2127

Ld when  $W = 14$  is 1900

