This is the guide to Fall 2018, Midterm 1, Form A. If you have another form, the answers will be different, but the solution will be the same. Please consult your TA or instructor if you think there is an error in the guide – it is not guaranteed to be mistake free.

1. This is the form ID question. For Form A, the answer is A.

2. Natural gas and coal are substitutes. Cheaper natural gas will drive more buyers to switch from coal to natural gas. Demand curve shifts down and to the left, so $Q^{coal} \downarrow$ and $P^{coal} \downarrow$. The answer is D.

3. Raising coal miner wages increases the production cost of coal. Supply curve shifts up and to the right, $Q^{coal} \downarrow$ and $P^{coal} \uparrow$. The answer is B.

4. Both shifts cause $Q^{coal} \downarrow$, (i) causes $P^{coal} \downarrow$ and (ii) causes $P^{coal} \uparrow$. Therefore, the combined effect on P^{coal} will depend on the relative magnitude of (i) and (ii). The answer is B.

5. For inferior goods, demand curve shifts down and to the left when income increases, so $Q^{smidget} \downarrow$ and $P^{smidget} \downarrow$. The answer is D.

6. (i) causes demand curve to shift down and (ii) causes supply curve to shift down. Both result in $P^{smidget} \downarrow$ but move $Q^{smidget}$ in opposite directions. The answer is D.

7. For A, D6 makes a profit of $4 - $5 = -$1 whereas he makes zero profit before (since he does not participate in any exchange). He is worse off than before.
   For B, D6 makes a profit of $4 - $4.5 = -$0.5 versus zero profit in the original allocation. He is worse off than before.
   For C, S2 makes a positive profit of $6.5-$2 = $4.5 and D3 makes a positive profit of $7-$6.5=$0.5. This is a Pareto improvement.
   For D, S8 makes a profit of $6-$8=-$2. She is worse off than before.
   For E, S8 makes a profit of $6-$8=-$2. She is worse off than before.
   Only C is a Pareto improvement. The answer is C.

8. Free market price is $5 < $7, so the price floor is binding. This is the case of excess supply. Both S6 and S2 is willing to produce at $7. Who ends up producing will depend on what rationing rule is used. The answer is D.

9. In this allocation, 9 widgets will be produced. However, the efficient quantity is only 5. This allocation is inefficient because it violates the third principle of efficient allocations. The answer is B.

10. In this scenario, demand curve is downward sloping and supply curve is horizontal. A tax, i.e. a vertical wedge between the demand and the supply curve, will increase the price paid by the buyers but will not lower the price received by the sellers. It will also move the quantity to the left. The answer is A.

11. The First Welfare Theorem is stated in Lecture 4(i). It assumes the market structure is perfect competition ((1) in the list) and that there are no externalities ((4) in the list). Therefore, the correct answer is C.

12. We first sort the buyers' bids from the highest to the lowest and the sellers' bids from the lowest to the highest.

Buyers	Bid (Offer to buy in $)	Sellers	Bid (Offer to sell in $)
Bashful	20	Daffy	5
Sneezy	10	Donald	10
Sleepy	3	Minnie	15
Happy	3	Goofy	16
Grumpy	1	Mickey	17

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We find that in the sorted table, the buyer's bid and the seller's bid is equal at $10. The answer is D.

13. Any buyer who submit a bid higher than the price ($10) will purchase electricity. From the table, we see that they will be Bashful and Sneezy. The answer is D.

14. For a $3 tax, we need to find the quantity where there is a $3 difference in demand and supply curve. This happens at $Q = 3$. Total tax revenue = quantity $\times$ tax $= 3 \times 3 = 9$. The answer is C.

15. The deadweight loss is the area of the triangle formed by the demand curve, the supply curve and the tax wedge. The area is equal to $(6 - 3) \times (5 - 2)/2 = 4.5$. The answer is C.

16. With no tax, $P^e = 2$. Consumer surplus is the area between the demand curve and the horizontal price level. The area is equal to $6 \times (8 - 2)/2 = 18$. The answer is A.

17. In the dridget market, a $1 tax decreases quantity by 1 unit. The deadweigh loss in this case is $(6 - 5) \times (3 - 2)/2 = 0.5$. The deadweight loss in the gribbet market is exactly the same. Adding the two, the combined deadweight loss equals 1. The answer is A.

18. Comparing the answers for question 15 and 17, the deadweight loss is 4.5 under the original plan and 1 under the new plan. The answer is B.

19. Under the new plan, tax revenue in the dridget market = quantity $\times$ tax $= 5 \times 1 = 5$. Tax revenue for the two markets will be $5 \times 2 = 10$, which is higher than the original tax revenue. The answer is B.

20. When the quota level is 2, the price of a gribbet is where the vertical quantity level intersects the demand curve, which equals $6. The price of a quota is the price of gribbets minus the cost of production $= 6 - 2 = 4$. The answer is D.

21. Total market value of the quota is maximized when the area of the rectangle between the horizontal price level, the horizontal supply curve and the vertical quantity level. This happens when the rectangle is a square, which in turn happens when the quota quantity is 3. The answer is E.

22. When price is at K, quantity demanded is where demand curve meets the price level, at N. Similarly, quantity supplied is at L. This is the case of excess demand. The magnitude of excess demand is the difference between Q^d and Q^s, which is equal to LN. The answer is E.

23. When resales are allowed, the consumers with the highest value will get the goods. Consumer surplus will be the area between demand curve, price level and quantity level, which is equal to ACLK. The answer is D.

24. When the price is at B, quantity supplied is at E. For there to be an equilibrium at this price, the government needs to shift the demand curve to the right so that it meets the supply curve at point E. To achieve this, the government needs to purchase CE units of goods at price E. The resulting spending equals CEUS. The answer is A.

25. Smidgets are either complements or substitutes to widgets, so the invention of smidgets affects the widget market through the demand curve. Since P^{widget} increases, demand curve shifts to the right. This happens when smidgets are complements to widgets. Q^{widget} remains unchanged, which happens when the supply curve for widgets is perfectly inelastic. The answer is B.

26. Denote $P_1 = 11, P_2 = 9, Q_1 = 3, Q_2 = 5$. We calculate elasticity using the midpoint formula:

$$e^D = -\frac{\%\Delta Q^D}{\%\Delta P^D}$$

$$= -\frac{\frac{Q_2 - Q_1}{\frac{1}{2}(Q_2 + Q_1)}}{\frac{P_2 - P_1}{\frac{1}{2}(P_2 + P_1)}}$$

$$= -\frac{\frac{5-3}{\frac{1}{2}(5+3)}}{\frac{9-11}{\frac{1}{2}(9+11)}}$$

$$= -\frac{\frac{2}{4}}{\frac{-2}{10}} = 2.5$$

Since $e^D > 1$, demand is elastic. The answer is A.

27. The figure shows that for each \$1 increase in gas tax, price paid by the consumers also increases by approximately \$1. This is the case when supply is very elastic. When tax is introduced, P^D increases a lot but P^S drop very little. Consumers, not producers bear the primary burden of gas taxes. The answer is D.

28. When there is a binding price ceiling, the market exhibits excess demand. All producers with costs lower than the price ceiling can produce, but not all consumers with reservation value higher than the price ceiling can consumer the widgets. Whether highest reservation consumers can consumer will depend on the efficiency of rationing. The answer is C.

29. Recall the formula for demand elasticity:

$$e^D = -\frac{\%\Delta Q}{\%\Delta P} = -\frac{0.06}{-0.28} = \frac{0.06}{0.28}$$

The answer is B.

30. We need to argue that the gasoline prices and quantities in June 2014 and June 2015 are two different points of the same demand curve. This makes sense when demand curve did not shift and supply curve shifted during this time period. Also, to estimate elasticity more precisely, we want price changes to be large (so measurement errors are small in comparison). The answer is D.

31. Quantity demanded for inferior goods decrease when income increases. So income elasticity is negative. For necessity goods, income elasticity is between 0 and 1. When income increases, quantity demanded increases but spending share decreases. The answer is E.

32. This is a binding price ceiling, so there will be excess demand. All sellers with cost lower than \$30 will be able to sell the book, so they are unlikely to bid a price lower than \$30 and unable to bid a price higher either. So your optimal bid is \$30. The rationing rule here is first-come-first-serve, so your optimal timing is to bid immediately. The answer is C.

33. Milk produced in the United States is a substitute for milk produced in Canada. Demand will shift down and to the left when a substitute is introduced. The amount of quota is fixed, so the price of milk will decrease. Since the cost of production doesn't change, the price of quota, which is equal to the price of milk minus cost, also decreases. The answer is C.

34. From Reading 2, the retail price of gas differs a lot across countries (\$7 in Norway and \$2.8 in the US). So, the difference in consumption is mainly explained by the difference in prices. The answer is B.