4. 出處：2019 台大工管、台大經濟，台大農經

原題：

Steven is fond of cigars. His utility function is , where c is the number of cigars he smokes per week and x is the money that he spends on the consumption of other goods. Steven has $200 a week to spend. Cigars used to cost him $1 each, but their price went up to $2 each. This price increase was "as bad" for him as losing income of

(A)$5

(B)$7.25

(C)$9

(D)$8

(E)$8.50

5. 出處：2019 台大工管、台大經濟，台大農經

原題：

A student spends all of her income on pizza and books. When pizzas cost $3 each and books cost $10 each, She consumed 30 pizzas and 3 books per month. The price of pizzas fell to $2.90 each while the price of books rose to $11 each. The price change

(A) made her worse off.

(B) left her exactly as well off as before.

(C) left her at least as well off as before and possibly helped her.

(D) might have helped her, might have harmed her. We can't tell which unless we observe what she consumed after the price change.

(E) had the same effect as a $3 increase in her income.

8. 出處：修改自大陸研究所考題

原題：

假設有一家獨占的鋼鐵廠，成本函數為 $C(q) = q^2 + 60q + 100$，其面對到的需求曲線為 $p = 200 - q$。鋼鐵廠每生產出一單位的鋼鐵將產生 0.1 單位的污染 z，故 $z = 0.1q$。清理污染的成本函數為：污染總成本$= 100 + 400z$，其中 z 是污染量。

(1) 假設廠商可以自由排放污染，其產出水準與均衡價格為多少？

(2) 假設廠商必須支付污染成本，其產出水準與均衡價格為多少？

(3) 透過支付污染成本能否讓廠商降低污染？請分別算出(1)、(2)種情況下的污染量並比較。

(4) 若政府希望用從量稅來減少污染排放，並減少到與(2)相同的污染量，則應該怎樣設計稅？

9. 出處：2019 政大財管、政大企管、政大經濟

原題：

There are four polluting firms in an industrial city. Their pollution levels and pollution abatement costs are given in the following table.

Firm	Initial Pollution Level	Cost of Reducing Pollution by 1 Unit
A	60 Units	$25
B	70 Units	$20
C	50 Units	$15
D	40 Units	$10

The city government wants to reduce pollution to 120 units, so it gives each firm 30 tradable pollution permits.

(1) Which firms will sell permits and how many do they sell? Which firms will buy permits and how many do they buy? What is the total cost of pollution reduction in this situation?

(2) How much higher would the costs of pollution reduction be if the permits could not traded?

(3) What size of a corrective tax would achieve the goal of reducing pollution to 120 units?