※ 選擇題請用 2B 鉛筆作答於答案卡，並先詳閱答案卡上之「畫記說明」。

Part I (12 points in total; 2 points each)

The following questions are about the figures below provided by Google Public Data Explorer with public data from the World Bank. Each chart is a scatter plot of the "Life expectancy" and "Fertility rate" for countries in a given year. "Life expectancy" is the average number of years a newborn is expected to live assuming current mortality patterns remain the same, and "Fertility rate" is the average number of births per woman. Each bubble on the chart represents a country in the world, and the bubbles are sized by population. The charts for 1960, 1990, and 2015, are shown as follows, respectively. We also highlight the location of China on each chart.
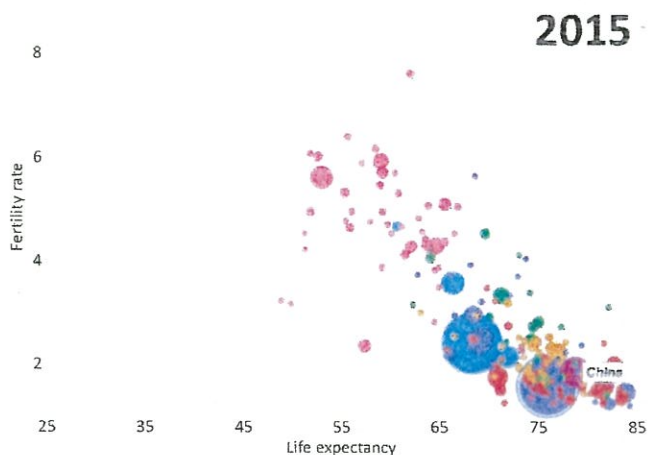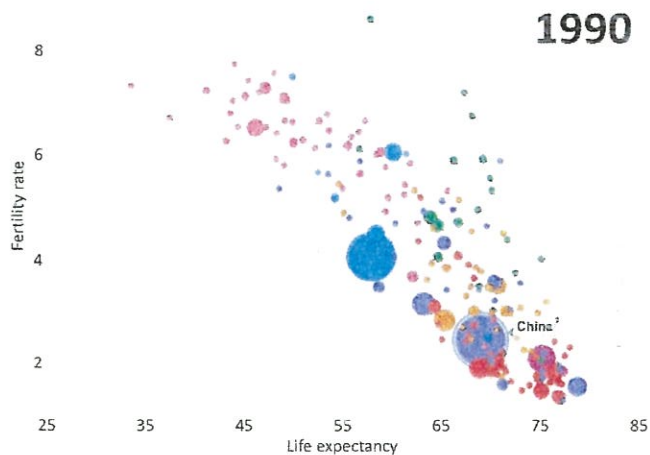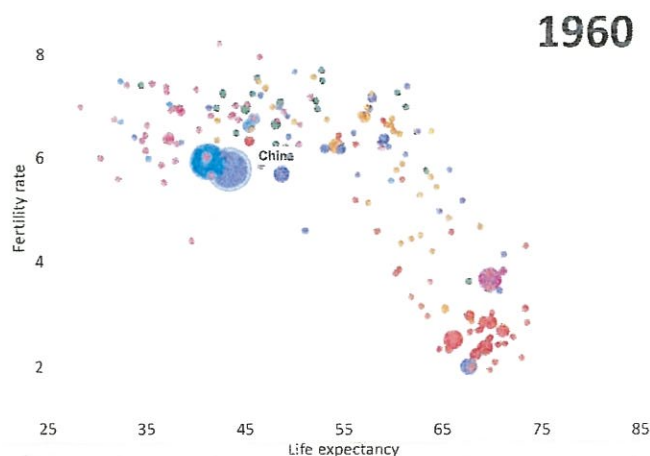
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For questions 1 to 8, choose the best possible answer from the list. There is a two-point penalty for each wrong answer. Total score, after penalties, will not be negative.

1. (2 points) In 1960, a woman in China gave birth to fewer than 4 children on average.
   A) True
   B) False

2. (2 points) If a man was born in China in 1990, he was expected to live for more than 80 years.
   A) True
   B) False

3. (2 points) Worldwide, people who were born in 2015 are expected to live longerthan people who were born in 1960.
   A) True
   B) False

4. (2 points) On average, women had fewer babies in 2015 than in 1990.
   A) True
   B) False

5. (2 points) From the information provided, we observe that there is a positive correlation between "Life expectancy" and "Fertility rate".
   A) True
   B) False

6. (2 points) Therefore, we can conclude that prolonged life expectancy is the only cause of the low fertility rate.
   A) True
   B) False

Part II (8 points in total; 4 points each)

Behavioral economics studies the effects of psychological, social, cognitive, and emotional factors on economic decisions, aiming to increase the explanatory power of economics by providing it with more realistic psychological foundations. Choose the best possible answer to questions 7 and 8 about behavioral economics.

Consider two scenarios:

Scenario 1: You have $1,000 and you must pick one of the following choices:
   Choice A: You have a 50% chance of gaining $1,000, and a 50% chance of gaining $0.
   Choice B: You have a 100% chance of gaining $499.

Scenario 2: You have $2,000 and you must pick one of the following choices:
   Choice A: You have a 50% chance of losing $1,000, and 50% of losing $0.
   Choice B: You have a 100% chance of losing $499.

7. (4 points) If a person always tries to maximize her expected monetary payoffs, she should:
   A) Choose A for scenario 1 and choose A for scenario 2.
   B) Choose A for scenario 1 and choose B for scenario 2.
   C) Choose B for scenario 1 and choose A for scenario 2.
   D) Choose B for scenario 1 and choose B for scenario 2.

8. (4 points) If a study finds that an overwhelming majority of people choose B for scenario 1 and A for scenario 2, it shows that:
   A) People are risk seeking in the loss domain and risk seeking in the gain domain.
   B) People are risk seeking in the loss domain but risk averse in the gain domain.
   C) People are risk averse in the loss domain and risk averse in the gain domain.
   D) People are risk averse in the loss domain but risk seeking in the gain domain.

Part III (10 points in total; 1 point each)

Bitcoin is a cryptocurrency and worldwide payment system. It is the first decentralized digital currency, as the system works without a central bank or single administrator. The network is peer-to-peer and transactions take place between users directly, without an intermediary. These transactions are verified by network nodes through the use of cryptography and recorded in a public distributed ledger called a blockchain. Bitcoin has a much lower transaction fees than other forms of payment such as credit cards, Paypal, and Apple Pay. Until the end of 2017, 4.11% of addresses own 96.53% of bitcoin.

Bitcoins are created as a reward for a process known as mining. *Mining* is a record-keeping service done through the use of computer processing power. Miners keep the blockchain consistent, complete, and unalterable by repeatedly verifying and collecting newly broadcast transactions into a new group of transactions called a *block*. Bitcoin's inventor Nakamoto set a monetary policy based on artificial scarcity at bitcoin's inception such that there would only ever be 21 million bitcoins in total.. As of 2017, there were 16 million bitcoins are in circulation.

Bitcoins can be exchanged for other currencies, products, and services. As of February 2015, over 100,000 merchants and vendors accepted bitcoin as payment. Bitcoins are often used for international remittances as it is much cheaper than other means of transfering money across borders. The value of bitcoin is determined by bitcoin exchanges and fluctuates wildly, ranging from $1 to as high as $20,000 on December 17,2017. A Japanese bitcoin exchange was hacked and went bankrupt, investors lost all their money.

Due to the nature of anonymity, safety, and non-tractability, bitcoins are often used in money laundering, criminal transactions (such as ransomware attack like WannaCry) and tax evasion. Governments around the world have different regulations on the use of bitcoin as a "digital currency". Some governments ban the use of bitcoin for all purposes.

Answer the following questions carefully:
True and False questions: Answer A on the answer sheet if it is more likely to be true and answer B if it is false.

One point each **and one point penalty** for each wrong answer. Total score, after penalties, will not be negative.

9. Mining could increase the supply of bitcoin till 21 million.
10. Bitcoin prices are easier to manipulate due to its ownership concentration.
11. Bitcoin has strong support for its value.
12. Government regulations will significantly affect the value of bitcoin.
13. The scarcity of bitcoin will increase its price.
14. Bitcoin can be counterfeited
15. Other things being equal, Bitcoin price increases will enhance the demand for computers and electricity.
16. The current bitcoin price is around $11,000. This price reflects more on the demand for transactions than demand for speculative investment.
17. There are network externalities on merchants' acceptance of bitcoin as a form of payment.
18. The *WannaCry* ransomware, a cryptoworm, attacked computers by encrypting data and demanding ransom payments in the Bitcoin cryptocurrency.

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Part IV (10 points in total; 1 point each)

Trumpeconomics refers to tax cuts, deregulation and infrastructure spending—in other words, more growth. Little of what was feared about Mr Trump's economic policy has come to pass. To some, rising economic growth, which exceeded 3% in the second and third quarters of 2017, combined with accelerating blue-collar wages, suggest that Mr Trump has delivered on his promise to invigorate the economy.

In truth, Mr Trump has benefited from a global economic surge that has lifted confidence—and stockmarkets—across the rich world. His timing with regard to the labour market was particularly fortunate. He came to office with unemployment at 4.8% and falling (it is now 4.1%). Pockets of strong wage growth, and high consumer confidence, are the natural result.

However, Mr Trump has at least not disrupted the economic recovery. His worst ideas, particularly with regard to trade, remain to be seen. He pulled out of TPP, just imposed severe tariffs on solar panels and washing machines, and threatened to pull out of the North American Free-Trade Agreement (NAFTA), which would have been cataclysmic for many firms. But he stepped back from the brink; the deal is instead being renegotiated.

It is not just his trade policy that has been more moderate than expected. The tax cuts that Mr. Trump signed into law in December were restrained compared to what he had promised on the campaign trail. Their cost (in revenue lost) is estimated at around $1.5trn over a decade, before accounting for their effects on economic growth. Among other things, the president relented on his demand for a 15% corporate tax rate. It fell to 21%, from 35%,instead. Also, Mr. Trump slashed the taxes, from 35% to 14%, imposed on corporations which bring profits earned overseas back to US. Apple Inc. just announced that it will pay $38 billion in taxes to bring overseas cash back to the US.

The tax cuts are still poorly timed, because the economy does not need fiscal stimulus at the moment. Yet they should boost growth somewhat, depending on how much the Federal Reserve tightens monetary policy in response.

On regulation, Mr Trump has stayed much closer to his campaign rhetoric. Government agencies have all but stopped writing new rules. The clean power plan, President Barack Obama's flagship environmental regulation, is being unwound. The Federal Communications Commission has voted to repeal net neutrality rules.Net neutrality is the principle that governments should mandate Internet service providers (such as AT&T) to treat all data on the Internet the same, and not discriminate or charge differently by user, content, website, platform, application, type of attached equipment, or method of communication. The administration let Mr Obama's proposed rule on overtime pay die in court and delayed new regulations governing retirement advice. Numerous smaller rules have been postponed or weakened, too. At a minimum, deregulation has made business owners swoon.

Answer the following questions carefully:
True and False questions: Answer A on your answer sheet if it is more likely to be true and answer B if it is false.
One point each **and one point penalty** for each wrong answer. Total score, after penalties, will not be negative.

19. Trumpeconomics focuses on monetary policies.
20. Trumpeconomics increases tariffs and companies will pass the increase to consumers and eventually hurt US consumers.
21. Apple's profits earned from other countries over the years should exceed $200 billion.
22. Based on the article, Trump's tax cuts may induce the Fed to decrease interest rates.
23. Trumpeconomics is protectionist in nature.
24. Trumpeconomics believes in big government.
25. Neflix can now pay more to get its movies to stream faster to its customers.
26. The labor market is tight in the US now.
27. Trumpeconomics will increase both US government and trade deficits.
28. As of now, the US has refused to join both TPP and NAFTA.

Part V. Transfer Paradox (20 points in total; 5 points each)

It is the phenomenon that an international income transfer may harm the recipient while enriching the donor in the field of international trade. To examine the phenomenon, we consider the overlapping generations model. There are two countries in the world economy, a donor (D) and recipient (R). Let τ denote the transfer from country D to R. We set $\tau^D = -\tau$ and $\tau^R = \tau > 0$.

29. All individuals live for two periods – youth and old age – and the population growth rate is $n > -1$. During each period, two individuals are alive in each country, one in the first and one in the second period of his life, 1 and 2, respectively: the young who supply their labor and earn wages, and the old who retire and consume savings accumulated. Given the interest rate (r) and wage (w), individuals in country i $(i = D, R)$ choose consumption in both periods, c_1^i and c_2^i, so as to maximize their utility:
$$u^i\left(c_1^i, c_2^i\right) = \ln c_1^i + \beta^i \ln c_2^i$$
subject to the budget constraint in their respective young and old periods:
$$c_1^i + s^i = w + \tau^i \text{ and } c_2^i = rs^i$$
where s^i is savings. The maximization yields the savings function, $s^i(w, r; \tau^i)$ and the indirect utility function, $V^i(w, r; \tau^i)$.
Derive the saving functions assuming $\beta^D = 3$ and $\beta^R = 1$. In which country do the individuals have a higher marginal propensity to save? Explain.

30. The two countries utilize a common technology in their production. Firms demand capital and labor from individuals so as to maximize their profit in per capita terms:
$$f(k) - rk - w$$
where $f(k) = \sqrt{k}$ and k is per capita capital, which is chosen so as to equate the respective marginal productivities of capital and labor to their factor payments:
$$f'(k) = r \text{ and } f(k) - f'(k)k = w$$
Derive the capital demand function $k(r)$ and the wage $w(r)$. Does the interest rate increase the wage? Explain.

31. Full international capital mobility is assumed. The world capital market equilibrium condition is that the interest rate equals, in per capita terms, the aggregate savings of each young generation with investment:
$$s^D(w(r), r; -\tau) + s^R(w(r), r; \tau) = 2(1 + n)k(r)$$
Derive the equilibrium interest rate $r(n)$ when there is no transfer $(\tau = 0)$. Also, derive the transfer $\tilde{\tau}(n)$ that yields $r = 1$. Does the transfer increase the equilibrium interest rate? Explain.

32. One can show that in equilibrium the (indirect) utility of the recipient decreases if there is transfer, i.e. $V^R(\tau^R = \tilde{\tau}) < V^R(\tau^R = 0)$, when n is small enough.
Provide a possible explanation for why the recipient suffers when it receives an international income transfer.

Part VI (12 points in total; 4 points each)

The owner of a new restaurant is considering whether or not to advertise to attract customers. Quality of the restaurant is eitherhighorlow. Let A denote the amount of advertising expenditure for commercials and ads on television as well as in the newspaper. A consumer observes how much advertising is conducted, updates her beliefs about the quality of the restaurant, and then decides whether or not to go to the restaurant. Assume that the price of a meal is fixed at $50. The value of a high-quality meal to a consumer is $85 and for a low-quality meal it is $30. If the food is of high quality, then the consumer anticipates going to the restaurant a second time. For the restaurant owner, the cost of providing a meal is $35 regardless of the restaurant's quality. If the consumer does not go to the restaurant, then her payoff is zero and the owner's payoff is $-A$.

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33. Complete the payoff matrix in the following table:

Restaurant Quality	Owner's payoff	Customer's payoff
Low		
High		

34. How much should the restaurant owner spend on advertising (i.e., *A*) to demonstrate that the restaurant is a high quality one?

35. If the probability that the restaurant is of high quality is *P*, what should the value of *P* be so that the advertising expenditure will be effective in signaling the restaurant's quality?

Part VII (8 points in total; 4 points each)

MedTai Biology Inc., a biotech startup specializing in pancreatic cancer drugs, has decided to sell itself to one of two potential bidders: Taipei-based EnginePharma and U.S.-based Mackmerri Pharmaceuticals. EnginePharma and Mackmerri will simultaneously submit a written bid. According to the latest funding round by venture capitalists, MedTai's fair value should not exceed $10 million. From the two bidders' corporate history in acquisition transactions, it is well known that EnginePharma's bid must be an odd number between 1 and 9 (i.e., it must be 1, 3, 5, 7, or 9), and Mackmerri's bid must be an even number between 2 and 10 (i.e., it must be 2, 4, 6, 8, 10). The bidder who submits the highest bid wins the right to acquire MedTai and pays a price equals to its bid. The winning bidder's payoff equals its valuation of MedTai less the price it pays, while the losing bidder's payoff is zero. Assume that EnginePharma's valuation of MedTai is $8 million, and Mackmerri'svaluation is $7 million.

36. Write down the payoff matrix of this bidding game.

37. Derive all Nash equilibrium(s).

Part VIII (15 points in total; 5 points each)

Assume that as of December 31, 2018, the ending total capital and total accumulated depreciation of the *hypothetical country* of Wonderland are 22,500 and *4,500, respectively*. Gross investment (*I*) had been given by the equation $I = 7,500 - 150r$, where *r* is the real interest rate. On December 31, 2018, lawmakers passed *anti-capitalism legislation and* made businesses want to invest less. The new laws change the gross investment equation to $I = 6,000 - 150r$ in year 2019.

In year 2019,
- *annual depreciation is 1,350,*
- GDP is 15,000,
- consumption (*C*) is given by the equation $C = 3,600 + 0.9(Y - T) - 150 r$, and
- taxes (*T*) are 3,000 and government spending (*G*) is 4,500.

38. What is the ending total capital as of December 31, 2019? If in 2019 the nominal interest rate is 7 percent, what is the concurrent inflation rate in Wonderland? **(5%)**
39. What are the equilibrium values of *C*, *I*, and *r* in 2019? **(5%)**
40. What are the values of private saving, public saving, and national saving in 2019? **(5%)**

Part IX (5 points in total)

Among the firms in financial distress in Wonderland, *The Elm Street Journal* suffered because its clients substantially cut their advertising spending from January 2017 to June 2018. *The Elm Street Journal,* in an attempt to *boost its sales* team efficiency, equipped its sales department with "robot salesmen" in June 2018. After *deploying the robots*, revenue from advertising sales increased.

In assessing whether the improvement in advertising sales can properly be attributed to the d*eployment of robots by The Elm Street Journal,* each of five close friends of *The Elm Street Journal's* CEO suggests one research question in December 2019.

● Mr. Green asked, "Among the advertisers in the *The Elm Street Journal*, are there more types of retail business or more types of industrial business?"

● Mrs. White asked, "What proportion of the total revenue of the *The Elm Street Journal* is generated by advertising sales?"

● Mrs. Black asked, "Among all the types of industry and retailing that use the *The Elm Street Journal* as an advertising vehicle, which type accounts for the largest proportion of the newspaper's advertising sales?"

● Mrs. *Burgundy* asked, "Do any clients of the sales representatives of the *The Elm Street Journal* have a standing order with *The Elm Street Journal* for a fixed amount of advertising per month?

● Mrs. Brown asked, "Has the circulation of the *The Elm Street Journal* increased substantially in the last eighteen months?"

41. Whose suggested research question would be most helpful? Why?　(5%)

試題隨卷繳回