

**VICTORIA JUNIOR COLLEGE
JC2 PRELIMINARY EXAMINATION 2024
HIGHER 1**

ECONOMICS

8843/01

Paper 1

9 September 2024

3 hours

No additional materials are required.

READ THESE INSTRUCTIONS FIRST

An answer booklet will be provided with this question paper. You should follow the instructions on the front cover of the answer booklet. If you need additional writing paper, ask the invigilator for a continuation booklet.

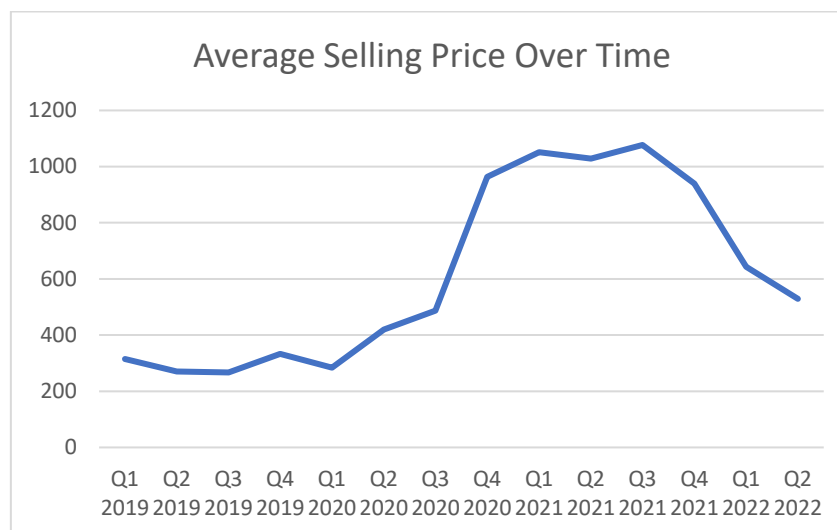
Answer **all** questions.

The number of marks is given in brackets [] at the end of each question or part question.

Answer all questions

Question 1: Inequality and sustainability in the age of AI

Figure 1: Average selling price of Graphics Processing Units, 2019 – 2022 (US\$)



Source: PCgamer.com, 13 September 2022

Extract 1: Are GPU prices set to rise again in 2023?

Graphics Processing Units (GPUs) prices are always a contentious issue. During the COVID-19 pandemic, GPU prices rose dramatically as production was slashed, shipping was delayed, and supply chains were disrupted. Those forced to stay home also decided to buy better gaming and crypto-mining hardware. Since then, prices have dropped, although the introduction of GPUs starting from a high US\$1,600 per unit has somewhat warped the market. There are now reports that GPU prices are set to wobble once more.

Adapted from makeuseof.com, 15 August 2023

Extract 2: Nvidia claims breakthrough in semiconductor production speed

Nvidia says it has unlocked a way for the tech industry to produce next-generation semiconductors used in the production of GPUs at a faster rate with less energy costs. The GPU maker has developed a way to streamline a key part of the semiconductor production process known as lithography. Lithography essentially involves using light to create the intricate patterns on a silicon wafer to form the microscopic transistors. Nvidia is introducing “cuLitho,” a software library the company says can speed up computational lithography up to 40 times. A small portion of an Nvidia H100 enterprise GPU currently takes two weeks to process using existing technology. With cuLitho, a chip maker would only need a single eight-hour shift.

Source: pcmag.com, 21 March 2023

Extract 3: Researchers on the way to creating alternative to GPUs

Computer scientists from Rice University, along with collaborators from Intel, are developing a more cost-efficient alternative to GPU. The new algorithm is called “sub-linear deep learning engine” (SLIDE), and it uses general-purpose central processing units (CPUs) instead of

GPUs, and without specialised hardware. The development of SLIDE can potentially bring about many benefits in the artificial intelligence (AI) sphere, not only at a lower cost and in less time, but also without the need to rely on GPUs.

Adapted from Unite AI, 9 December 2022

Extract 4: Semiconductor production – growth that is not green

In addition to their strategic importance, semiconductors are South Korea's No. 1 export – worth \$128 billion in 2021 and accounting for roughly 20 per cent of all industrial activity.

The environmental costs of South Korea's semiconductor boom are considerable. In South Korea, the investment is concentrated in the country's central region, across a landscape of rivers and lakes that provide much of the densely populated capital area's drinking water. The industrial hub also straddles the Baekdudaegan, a mountain range that runs up the Korean Peninsula like a spine and acts as a habitat for wildlife. Vast amounts of industrial wastewater are flowing into public waterways around the clock.

Concerns about sustainability have become more pressing throughout the semiconductor industry as the scale of investment becomes greater. Amid the global turn toward environmentally friendly forms of production and growing sensitivity among consumers, chipmakers are set to face both direct and implicit forms of pressure to operate cleanly.

Samsung Electronics says it is doing everything possible to minimise the amount of wastewater discharged from its factory and to treat the water to remove contaminants before it is released. The semiconductor industry is also often associated with air pollution. Samsung Electronics developed a Regenerative Catalytic System that treats processed gas with a specific catalyst to minimise carbon emissions at production sites. "We aim to keep developing innovative technologies that can contribute to reducing carbon, treating pollutants, recycling water, and managing waste," the company continued. "We believe technology to be the bridging solution between carbon reduction and growth."

Source: Nikkei Asia, 14 December 2022

Extract 5: Automation and the minimum wage

According to a new academic research study, automation technology has been the primary driver in U.S. income inequality over the past 40 years. The report, published by the National Bureau of Economic Research, claims that 50 to 70 per cent of changes in U.S. wages since 1980 can be attributed to wage declines among blue-collar workers who were replaced or degraded by automation.

Artificial intelligence, robotics and new sophisticated technologies have caused a wide chasm in wealth and income inequality. It looks like this issue will accelerate. For now, college-educated, white-collar professionals have largely been spared the fate of degreeless workers.

Management consulting giant PriceWaterhouseCoopers reported, "AI, robotics and other forms of smart automation have the potential to bring great economic benefits, contributing up to \$15 trillion to global GDP by 2030." However, it comes with a high human cost. "This extra wealth will generate the demand for many jobs, but there are also concerns that it could displace many existing jobs."

Concerns of new technologies disrupting the workforce and causing job losses, have been around for a long time. On one side, the argument is automation will create new and better jobs and erase the need for physical labour. The counterclaim is that people without the appropriate skills will be displaced and not have a home in the new environment.

For those who may be left behind, there have been calls to raise the minimum wage. As with the general public, economists fall on both sides of the minimum wage issue. Proponents of a minimum wage argue that increasing the wage would improve the lives of low-income workers, making it easier for them to afford food, rent, and other necessities. Opponents argue that the policy might hurt the very group of people it intends to help, by reducing the number of low-skilled jobs.

Ultimately, the AI trend has the potential to adversely impact all classes of workers – even well-trained and experienced doctors will be pushed aside by sophisticated robots that can perform delicate surgeries more precisely and read x-rays more efficiently. Truck and cab drivers, cashiers, retail sales associates and people who work in manufacturing plants and factories have and will continue to be replaced by robotics and technology. Driverless vehicles, kiosks in fast-food restaurants and self-help, quick-phone scans at stores will soon eliminate most minimum-wage and low-skilled jobs.

Sources: Forbes, *14 April 2022*, and Federal Reserve Bank of St. Louis, *November 2021*

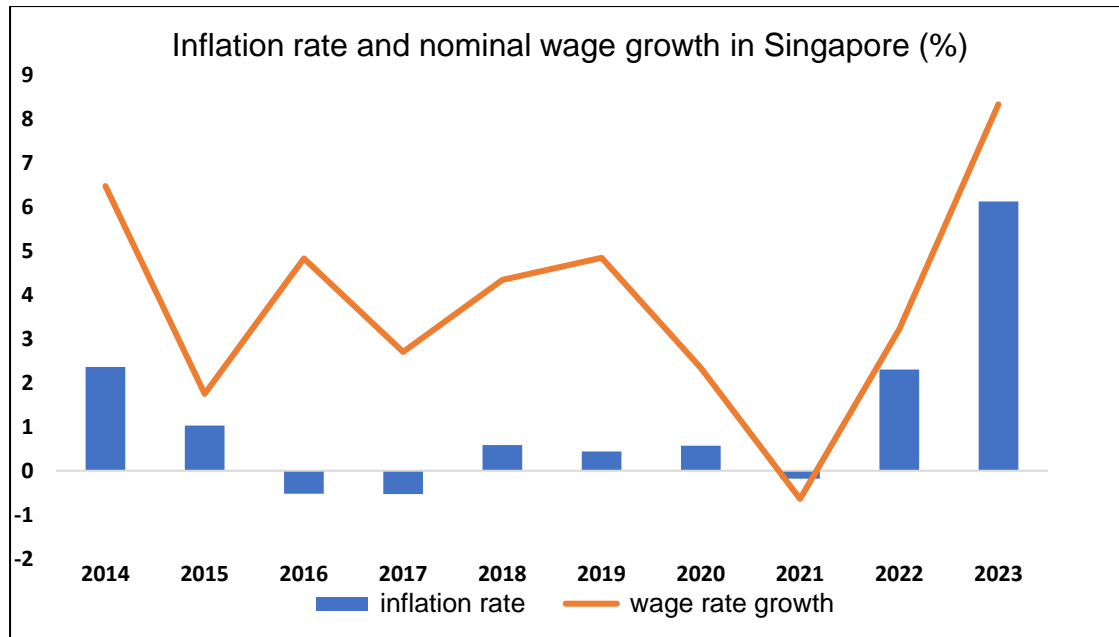
Questions

- (a) (i) Describe the trend in the average selling price of graphics processing units (GPUs) from Q1 2019 to Q2 2022. [2]
- (ii) Using Extract 1 and a diagram, explain the observed trend in the average selling price of GPUs. [5]
- (b) With reference to Extract 1, explain why a graphic processing unit has the characteristic of excludability. [2]
- (c) Explain the likely impact of the introduction of software such as “cuLitho” on the total revenue of GPU producers, and comment on whether this is likely to hold in the future. [6]
- (d) (i) Explain how a rational firm uses the marginalist principle to decide how many units of semiconductors to produce. [2]
- (ii) With reference to Extract 4 and using a diagram, explain why the price mechanism could lead to an over-production of semiconductors. [5]
- (iii) Discuss the appropriateness of the government policy of incentivising innovation in the semiconductor industry to improve societal welfare. [8]
- (e) Discuss whether increasing minimum wages is the key solution to addressing rising income inequality brought on by the increasing adoption of AI in the workplace. [10]

[Total: 40]

Question 2: Asia's Economic Performance Post COVID-19

Figure 2: Inflation rate and nominal wage growth in Singapore (%), 2014 - 2023



Source: Singstat

Table 1: Selected macroeconomic indicators of China and Singapore, 2021- 2022

	China		Singapore	
	2021	2022	2021	2022
Unemployment rate (%)	5.1	5.5	3.54	2.76
Real GDP per capita growth rate (%)	8.45	2.99	9.6	3.84
Inflation rate (%)	0.9	1.98	2.31	6.12

Source: Statista.com

Extract 6: ASEAN's economic recovery threatened by global inflation, Indonesia's growth remains resilient

Rising food and energy prices could weaken economic growth in some ASEAN countries. The risk of declining real household consumption may reduce investors' confidence, while rising energy prices raise transportation costs. These two factors would discourage firms to expand their businesses. While inflation erodes purchasing power for all, the burden of rising prices affects the poor and the vulnerable more severely.

The ASEAN Development Bank, however, has raised its growth forecast for Indonesia to 5.2 per cent this year from the April forecast of 5 per cent because of healthy domestic demand. The inflation rate in Indonesia has so far remained within Bank Indonesia's target of between 2 to 4 per cent. Although inflation has risen, high prices for key commodity exports are generating windfall export earnings and fiscal revenue from exporting firms, enabling the government to provide aid for costlier food, electricity, and fuel while still reducing the budget deficit.

Source: *The Diplomat*, June 2022 and *Southeast Asia Development Solutions*, August 2022

Extract 7: Singapore's Tourism Dilemma: The Shift in Tourist Flows

Some travel agencies and attractions in Singapore are seeing worse than expected tourist numbers this year, particularly from the top three groups – China, India and Indonesia. Many are blaming the weak tourist numbers on higher inflation causing higher cost for tour and hotel operators, the stronger Singapore dollar, along with new strategies employed by neighbouring countries to attract tourists. The higher costs and the competition from neighbouring countries have led many tourists to spend less time in the country or look elsewhere. Factors such as manpower constraints – which continue to plague many industries, may also curtail the tourism sector recovery.

Total room inventory in Singapore has increased by just 4.6 per cent over the past five years, with the bulk of new supply coming to the market (3,505 rooms) being in the upscale segment. A large reason for this is the significant increase in construction costs in Singapore. Construction costs is expected to increase between 2022 to 2024 which is the highest mark in the region.

Sources: The Straits Times, *January, 2023* and Hotel Investments Today, 2022

Extract 8: Digital boost, investment bust: The impact on Singapore's employment

The Singapore Tourism Board and Infocomm Media Development Authority (IMDA) have introduced the inaugural Industry Digital Plan (IDP) for the Tourism (Attractions) sector. The Tourism (Attractions) IDP serves as a roadmap for local attractions, including small and medium enterprises (SMEs), providing practical guidance on adopting digital solutions. Attractions can leverage digital tools to address challenges such as customer query management and energy consumption tracking. The rise in such innovation-based investments will create new job roles in the tourism industry.

Despite these positive developments, Singapore's broader economic landscape faces significant challenges. The country saw a sharp decline in fixed asset investments due to stronger competition from nations with larger resources and domestic markets. Rising inflation is also a concern for the government, as it may further deter foreign direct investment and slow economic recovery.

Source: www.imda.gov.sg

Extract 9: ASEAN tourism and its impact on the economy

Tourism has been one of the key growth sectors in ASEAN and has contributed significantly to employment and growth in many ASEAN economies. The expanding middle class and improved connectivity led travel and tourism revenues to grow 5.5 per cent to US\$2 971 billion in 2019, accounting for 9.8 per cent of the region's gross domestic product (GDP). In some parts of ASEAN, such as Cambodia, Thailand and the Philippines, the travel and tourism sector contributes more than 20 per cent of the economy.

Vietnam is expanding transport infrastructure, including the North-South High-Speed Railway and key airports, while also considering luxury hotel projects to tap into the luxury market. Cambodia's Tourism Development Strategic Plan focuses on enhancing secondary tourist destinations to promote cultural and natural tourism. Its Tourism Investment Policy aims to boost rural development, cross-economic linkages, and environmentally friendly tourism.

Sources: Invest in ASEAN, *July 2022* and ASEAN Investment Portfolio, 2022

Extract 10: COVID-19 gave Asia a break from overtourism. Now what?

More than two years after the COVID-19 pandemic brought international travel to a halt, most countries in Southeast Asia have reopened their borders with minimal requirements for vaccinated travellers. Millions arrived over the summer, fuelled by pent-up wanderlust. The return of these tourists is a relief for an economically battered region — but it comes with its own costs.

Some Asian officials and community leaders are pushing back against a return to unchecked tourism, which has caused severe environmental damage. In 2019, nearly 40 million tourists visited Thailand, overwhelming areas like Patong Beach and Maya Bay, which regularly exceeded their carrying capacity. Experts note that Thailand, known for its hospitality, lacks the necessary zoning and land use regulations to manage tourism's impact effectively, even if political will existed.

Source: The Washington Post, *August 2022*

Extract 11: Central banks' monetary policy is diverging

While the Monetary Authority of Singapore (MAS) has tightened monetary policy to counteract persistent price pressures, China has adopted a different approach by cutting interest rates to stimulate its sputtering economic recovery from COVID-19 lockdowns.

China trimmed its key lending rates again one week after it cuts two interest rates as an attempt to revive credit demand and fire up the economy hurt by extended COVID-19 lockdowns and property debt problems. China's economic growth recently slumped to one of its lowest levels in nearly half a century due to strict COVID-19 restrictions and a property market downturn. The economy is under pressure from the contraction of the real estate industry, which makes a substantial contribution to China's GDP. Lower interest rates have not translated into higher property sales so far due to the lack of confidence in large developers.

On the contrary, Singapore's strategy to address its economic challenges was through monetary policy tightening. MAS anticipates core inflation to remain above its comfortable range, influenced by a tight labour market and low housing supply, which have driven up rental costs. Economist Masahiro Nozaki, however, highlighted that intensified geopolitical conflicts could increase volatility in global energy and food prices, and that the tight labour market and accumulated cost pressures from high wage growth in the past could lead to continued inflation stickiness. Unlike other central banks that focus on interest rates, MAS uses an exchange-rate-based framework, adjusting the Singapore-dollar exchange rate to manage its open, trade-heavy economy.

Sources: www.cnn.com, *August 2022* and
Monetary Authority of Singapore, *October 2022*

Questions

- (a) Using Figure 2,
- (i) What is cost of living and describe the change in the cost of living in Singapore from 2018 to 2023. [2]
 - (ii) Explain how the real wage in Singapore changed in 2023. [2]
- (b) With reference to Extract 6, explain two reasons why governments may be concerned with rising inflation and comment whether it is necessarily a concern for all governments. [6]
- (c) Singapore's neighbouring countries have employed new strategies to attract tourists [Extract 7].
- Using a diagram and the concept of price elasticity of supply, explain the impact of this phenomenon on the extent of change in the quantity of tourism services consumed by foreigners in Singapore. [4]
- (d) Explain how a fall in foreign direct investment might lead to one type of unemployment while a rise in innovation-based investment (Extract 8) might lead to a different type of unemployment. [4]
- (e) Explain how two additional indicators can supplement Table 1 to enable a more accurate comparison of the change in living standards between countries. [4]
- (f) Discuss the extent to which a rise in governments' spending to increase in-bound tourist arrivals will result in higher living standards for residents of ASEAN economies. [8]
- (g) Extract 11 highlights that China's Central Bank has implemented interest rate cuts whilst the Monetary Authority of Singapore has adopted an appreciation of the Singapore Dollar.
- Evaluate the appropriateness of the different monetary policy stance of China and Singapore. [10]

[Total: 40]

End of Paper