2024 Canadian Economics Olympiad – Round 1 Answers

Canadian Economics Olympiad is the only representative of the International Economics Olympiad in Canada authorized to select Team Canada for participation in the 2024 International Economics Olympiad. The International Economics Olympiad is an annual competition in Economics organized for high school students. It is intended to stimulate the activities of students interested in economics, business, and finance by way of creative problem-solving.

Please read the following information carefully and follow the submission instructions.

The 2024 Canadian Economics Olympiad consists of two rounds. This is Round 1. Based on the results of Round 1, students will be awarded Distinguished Honour Roll and Honour Roll recognition. In addition, top students will be recognized as National Finalists and will be invited to participate in Round 2. Round 2 will take place online on April 27 and will be used to determine the absolute winner and medalists of the Canadian Economics Olympiad and it is the main component of the Team Canada selection for the International Economics Olympiad.

This contest consists of 40 Multiple-choice or Answer-only problems. This test will be emailed to all registered participants on April 13 around 5pm Toronto time and solutions must be submitted by 8pm Toronto time (for students in different time zones: please make sure you know the exact local time of the start and submission). Each question is worth 1 point. There is no penalty for wrong answers.

To submit your answers, please, fill in the online submission form on the main page at https://www.ceo-oec.ca/ . Please, make sure to include your name, city/province, and school as you entered them at registration. Only the final answer should be submitted.

For each question:

- For Multiple choice questions, enter the letter corresponding to your answer choice. Please, use capital letters, e.g.: C
- For answer-only questions, please, enter the number only without any units, e.g.: 200 (and not $200, or 200kg). Please, round your answer as required by each question.

You are allowed and encouraged to use any online and offline resources during the contest, but you are not allowed to seek help from other people or Artificial Intelligence (either in-person or via phone, text, e-mail, online posts, and other forms of communication). You may not ask questions (either directly or indirectly) related to this contest or any economics, finance, or accounting topics between 5pm and 8pm Toronto time on the day of the test. This includes in-person, phone, text, e-mail, and any online communications or posts.

If you have questions about any part of the exam during the contest, please email canadian.economics.olympiad@gmail.com. In case any major mistakes are found, an email will be sent to all registered students. Please, monitor your email mailbox periodically.

Do not be discouraged if you cannot solve some of the questions. The exam was made hard intentionally and it is very likely that most students will not be able to correctly solve half of the questions.

Q1: A decrease in reserve requirements by the central bank most likely will lead to

A) An increase in import
B) An increase in budget deficit
C) Higher unemployment and inflation levels
D) An increase in the rate of saving
E) An increase in investment level by businesses

Ans: E

Q2: Which of the following can lead to higher inflation and unemployment levels?

A) A decrease in money supply
B) A decrease in government spending
C) An increase in inflationary expectations
D) A decrease in money velocity
E) An increase in productivity

Ans: C
Note: There was an important typo in this question that was not corrected during the exam. Thus, this question was excluded from the total score calculation and, to keep the maximum total score at 40, everyone was awarded 1 point for this question.

Q3: Which of the following could have been the most likely reason for the simultaneous increase in both real GDP and price level?

A) An increase in export
B) A decrease in inflationary expectations
C) An increase in the prime rate
D) An increase in income taxes
E) A decrease in oil prices

Ans: A

Q4: Which of the following results in a right shift of the short-run aggregate supply curve?

A) An increase in the natural rate of unemployment
B) An increase in wage level
C) An increase in interest rate
D) A decrease in capital stock
E) An increase in the expected price level

Ans: E

Q5: What would reduce a current account deficit?

A) Depreciating its currency
B) Implementing import substitution policies

C) Rapid rise in domestic income levels
D) Both a and b
E) All of the above

Ans: D

Q6: Bob, a small business owner, currently pays his employees minimum wage. He is considering raising his employees' wages by a certain amount. Why might he do this?

A) To increase his employees' productivity
B) To reduce employee turnover
C) To reduce costs of hiring new employees
D) B and C
E) All of A, B and C

Ans: E

Q7: Country A's central bank is considering altering the money supply in country A. The demand for money can be modeled as follows: MD = 250 - 500i, where i is the nominal interest rate. If the current nominal interest rate is 10%, which of the following new levels of money supply would correspond to contractionary monetary policy?

A) 100
B) 200
C) 300
D) Both A and C
E) None of the above

Ans: A

Q8: What is the effect of price discrimination in a monopolistic market?

A) It increases consumer surplus
B) It increases social surplus
C) It reduces total output
D) It reduces producer surplus
E) None of the above

Ans: B

Q9: Consider a standard perfect competition model. How the decrease in the fixed costs will affect the market price p and the production of a single firm in the market q in the long-run?

A) Both p and q will increase
B) Both p and q will decrease
C) p will increase while q will decrease

D) p will decrease while q will increase
E) At least one of these parameters (p or q or both) will remain the same

Ans: B

Q10: Consider a standard perfect competition model. How the decrease in the fixed costs will affect the number of firms N and the total production Q in the long-run?

A) Both N and Q will increase
B) Both N and Q will decrease
C) N will increase while Q will decrease
D) N will decrease while Q will increase
E) At least one of these parameters (N or Q or both) will remain the same

Ans: A

Q11: A Forward contract is a contract to buy (or sell) a specific asset for a specific price ("Forward price") at a specific time in the future. Assume today you enter into a Forward contract to buy one share of Macrosort three months from now for a price of $100/share. Macrosort stock has a systematic risk of $\beta=0.8$ and a total risk of $\sigma=30\%$ At the time you enter into a contract you neither receive nor pay any money because it was believed by all parties involved that $100 is a fair Forward price. What is today's expectation about Marcrosort stock price in 3 months?

A) It is equal to $100 because $100 is a fair Forward price
B) It is lower than $100 because $\beta<0.8$
C) It is higher than $100 because $\sigma<100\%$
D) It is lower than $100 because $\sigma<80\%$
E) It is higher than $100 because the return on Macrosort stock and the market return are positively correlated

Ans: E

Q12: To achieve the optimal production level in the market with a natural monopoly, the government should set the price ceiling and

A) Impose per-unit sale tax
B) Provide a lump-sum subsidy to the monopolistic firm
C) Encourage competition by introducing legislation limiting the annual production by a single firm
D) Do nothing else: the right price ceiling is enough to achieve the optimal production level in equilibrium.
E) None of the above

Ans: B

Q13: To meet the Paris Agreement goals (on climate change), the Trudeau government recently increased the fuel tax. This distortion to the competitive equilibrium leads to a reduction in social surplus but, given that Canada's contribution to global emission is only 1.5%, leads to an insignificant reduction in global CO2 emission. Assuming that (i) people in Canada are rational and (ii) the government's only objective is the well-being of Canadians, why Canada cannot simply get out of the Paris Agreement? Choose the answer based on game-theoretical arguments assuming (i) and (ii) above are correct even if you do not believe in these assumptions.

A) There are significant penalties for exiting the Paris Agreement or not meeting the set goals
B) If Canada exits the Paris Agreement, the probability that other countries will exit too will increase.
C) Canada will not be considered a trustworthy country and the cost of debt both for the Canadian government and Canadian firms will increase.
D) Canadians will be outraged that their own government does not care about their future.
E) Canadian energy industry will lose the international subsidies they receive based on the Paris Agreement

Ans: B

Q14: Stock AAA has a systematic risk of $\beta=1.2$ and a total risk of $\sigma=30\%$ while stock BBB has a systematic risk of $\beta=1.5$ and a total risk of $\sigma=24\%$. According to the Capital Asset Pricing Model, which stock should have a higher required return and why?

A) BBB because it has a higher systematic risk.
B) AAA because it has a higher total risk.
C) Same returns because 1.5/1.2=30/24
D) One needs to know the risk-free interest rate to answer this question.
E) Even if the risk-free interest rate were given, it is still not possible to answer this question.

Ans: A

Q15: In case of negative externalities, why does introducing a sales tax and distributing the tax revenue to low-income households may lead to a higher level of total negative externality?

A) Because to reduce negative externality, the government needs to introduce a per-unit tax on producers, not on consumers.
B) Because of the high transaction costs that are required to collect tax and distribute it
C) Because such policy only works in case of perfectly competitive markets
D) Because the consumers will switch to different products thus, avoiding paying this sales tax, which will make the tax revenue substantially lower than expected
E) Because low-income households have higher marginal propensity to consume

Ans: E

Q16: Which of the following bonds are affected by the change in the interest rates the most:

A) Bonds with long maturity time and high coupon rate
B) Bonds with short maturity time and high coupon rate
C) Bonds with long maturity time and low coupon rate
D) Bonds with short maturity time and low coupon rate
E) Floating-rate bonds

Ans: C

Q17: Consider a person with the utility function $U(A,B) = A^{1/3}B^{1/9}$ where A and B are different consumption goods. If the price of A increases by 2 times, how much the consumption of A will change?

A) It will decrease by 4 times
B) It will decrease by 3 times
C) It will decrease by 2 times
D) It will decrease by 1.5 times
E) It will not change.

Ans: C

Q18: Consider a person with the utility function $U(A,B) = A^{1/3}B^{1/9}$ m where A and B are different consumption goods. If the price of A increases by 2 times, by how much the consumption of B will change?

A) It will increase, by 4 times
B) It will increase by 3 times
C) It will increase by 2 times
D) It will increase by 1.5 times
E) It will not change

Ans: E

Q19: If a 10% wage increase results in a 20% decrease in employment, the labor demand is

A) Perfectly elastic
B) Elastic, but not perfectly elastic
C) Unit elastic
D) Inelastic, but not perfectly inelastic
E) Perfectly inelastic

Ans: B

Q20: If the demand for product X increases with disposable income, then X is

A) A normal good
B) An inferior good
C) A Giffen good
D) Produced by firms in competitive industry
E) Produced by a monopoly

Ans: A

Questions 21-37 are based on the following information:
Assume that the world economy consists of two countries: Estonia and Latvia. Each country can produce fish and meat. Estonia can produce 500 tons of fish or 250 tons of meat or any linear combination of fish and meat that satisfies fish+2×meat=500. Latvia can produce 600 tons of fish or 450 tons of meat or any linear combination of fish and meat that satisfies fish+4/3×meat=600. Countries can freely trade with each other and there are no transaction costs.

Q21: Which country has a comparative advantage in producing fish?

A) Estonia
B) Latvia
C) Both countries
D) Neither country
E) There is not enough information to answer this question

Ans: A

Q22: If the price of meat is $300 per ton, with free trade the price of fish can be any of the numbers below EXCEPT

A) $150
B) $225
C) $300
D) None of the above numbers can be the equilibrium price of fish
E) All of the above numbers can be the equilibrium price of fish

Ans: C

Q23: If the total world production of fish is 500 tons, which country benefits from trade?

A) Latvia only
B) Estonia only

C) Both countries can benefit from trade
D) Neither country benefits from trade
E) There is not enough information to answer this question

Ans: C

Q24: If the total world production of meat is 300 tons, which country benefits from trade?

A) Latvia only
B) Estonia only
C) Both countries benefit from trade
D) Neither country benefits from trade
E) There is not enough information to answer this question

Ans: B

Q25: If people in both countries prefer to have 70% of fish and 30% of meat in their diet, how much meat will be produced in Latvia?

A) None
B) 50 tons
C) 105 tons
D) 150 tons
E) 300 tons

Ans : E

Q26: If people in both countries prefer to have 70% of fish and 30% of meat in their diet, and the price of fish is $900 per ton, what is the GDP (Gross Domestic Product) in Latvia?

A) $540,000
B) $630,000
C) $720,000
D) $810,000
E) There is not enough information to answer this question

Ans: A

Q27: If people in both countries prefer to have 70% of fish and 30% of meat in their diet, how much fish is CONSUMED in Latvia?

a) Less than 200 tons
b) At least 200 tons but less than 300 tons

c) At least 300 tons but less than 400 tons
d) At least 400 tons but less than 500 tons
e) At least 500 tons

Ans: C

Questions 28-30 are based on the following information:
Suppose there are two goods in the market: X and Y. The consumer's income is $1000. The price of Good X, P_x=$20, and the price of Good Y, P_y=$50. The consumer seeks to maximize utility represented by the utility function $U(X,Y) = X^{0.5} * Y^{0.5}$, where X and Y are the quantity of Good X and Good Y, respectively.

Q28: Determine the consumer's optimal consumption of Good X

Ans: 25

Q29: Calculate the marginal rate of substitution (MRS) of X by Y.

Ans: MRS = MU_X / MU_Y = P_x/P_Y = 20/50=0.4
Because of non-conventional wording ("X by Y" instead of "X for Y", accept 50/20=2.5 too. Also accept negative signs)

Q30: If the price of Good Y increases to $100, how does this change the consumption of X and Y?

A) Consumption of both goods will increase
B) Consumption of both goods will decrease
C) Consumption of X will increase while consumption of Y will decrease
D) Consumption of X will decrease while consumption of Y will increase
E) None of the above

Ans: E

Questions 31-32 are based on the following information:
Consider a closed economy described by the following equations (here Y is the GDP)

- Consumption function: C = 200 + 0.8(Y - T)
- Investment function: I = 110
- Government spending: G = 250

- Taxes: T = 200

Q31: Calculate the equilibrium level of GDP

Ans: Y = 2000.

Q32: If the government decides to balance its budget and increase the taxes by $50 to T=$250, what will be the change in GDP, i.e., find Y_{after}-Y_{before}

Ans: Y_{after}-Y_{before} =-200

Q33: Apple Inc and Banana Corp both sell identical products with zero marginal cost and operate in an oligopolistic market where the price function is P = 1500 - Q. The way the market operates is as follows: Apple Inc and Banana Corp simultaneously set their prices and people buy the product from the company that set the lowest price. In case both companies set the same price, the quantity demanded is equally divided between the two firms. How much Banana Corp will produce in equilibrium (round your answer to the nearest integer number)?

A: 750 (accept 749 too)

Q34: Apple Inc and Banana Corp both sell identical products with zero marginal cost and operate in an oligopolistic market where the price function is P = 1500 - Q. The way the market operates is as follows: Apple Inc and Banana Corp simultaneously set their quantities and the price is determined from the demand function. How much Banana Corp will produce in equilibrium (round your answer to the nearest integer number)?

A: 500

Q35: Apple Inc and Banana Corp both sell identical products with zero marginal cost, and operate in an oligopolistic market where the price function is P = 1500 - Q. The way the market operates is as follows: Apple Inc chooses how much it will produce first, with Banana Corp deciding how much it will produce after observing Apple's decision. How much Banana Corp will produce in equilibrium (round your answer to the nearest integer number)?

A: 375

Q36: You just won a lottery that will pay you $1000 next year and then continue making regular annual payments to you (and your heirs) that increase by 3% each year forever. What

will be the current fair price of these payments if the risk-free interest rate is 5%? Round your answer to the nearest dollar

Ans: 1000/(0.05-0.03)=50,000

Q37: You just won a lottery that will pay you $1000 next years (at t=1) and then continue making the same regular payments to you (and your heirs) each other year (i.e., in years 3, 5, 7, …) What will be the current (at t=0) fair price of these payments if the risk-free interest rate is 5%. Round your answer to the nearest dollar.

Ans: (1000/(1.05^2-1))*1.05=$10243.9

Q38: The firm's production function is $Q = 5\sqrt{LC}$, where L is the amount of labor and C is the amount of capital. The cost of labor is $500 per unit and the cost of capital is $800 per unit (fractional units of labor and capital can be used). The company has a budget of $1,000,000 for labor and capital. Find the maximum production (rounded to the nearest unit) if the company allocates its resources optimally.

Answer: 3952.8

Questions 39-40 are based on the following information:
Consider a person with utility function $U(C, L) = \ln(C) + a * L^b$, where C is daily consumption, L is leisure, and a>0 and b>0 are constants. For simplicity, we will assume that consumption is equal to income and L=24-h, where h is the number of hours they work per day. Assume this person earns an hourly wage of $w per hour. Let w=$20, b=1, and a=0.1

Q39: How many hours will this person work each day?

Ans: 10

Q40: If the wage increases by $5 from w=$20 to w=$25, how much will the optimal work hours change?

A) Increase by 25%
B) Increase by 20%
C) Will not change.
D) Decrease by 20%
E) Decrease by 25%

Ans: C