Name _____   SMU ID_____

ECO 3302, Spring 2025 − Midterm 1
Intermediate Macroeconomics
March 14, 2025

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Allowed utensils: Pen, paper, eraser, and non-graphic calculator.

General Instructions:

- You have 50 minutes to complete the exam.

- The exam consists of 20 multiple choice questions (each worth 3.5 points) and 6 short-answer questions (each worth 5 points).

- There is only one (1!) valid answer per multiple choice question (MCQ). No points will be subtracted for wrong answers.

- Answer all MCQ questions in the sheet provided below.

- If you make a mistake when answering a MCQ and want to change your answer, please cross the 4 options (A, B, C, D) and clearly write on the right of box D the letter associated with your final answer.

- Be short and to the point in the short-answer questions. Correct answers typically don't require more than 5–6 lines of text.

- DO NOT REMOVE THE STAPLE FROM YOUR EXAM.

- Make sure to submit all pages of your exam.

Good luck!

MCQ Answer Sheet

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How to answer:

(A) (B) ● (D)

Questions:

1.   (A) (B) (C) (D)
2.   (A) (B) (C) (D)
3.   (A) (B) (C) (D)
4.   (A) (B) (C) (D)
5.   (A) (B) (C) (D)
6.   (A) (B) (C) (D)
7.   (A) (B) (C) (D)
8.   (A) (B) (C) (D)
9.   (A) (B) (C) (D)
10. (A) (B) (C) (D)
11. (A) (B) (C) (D)
12. (A) (B) (C) (D)
13. (A) (B) (C) (D)
14. (A) (B) (C) (D)
15. (A) (B) (C) (D)
16. (A) (B) (C) (D)
17. (A) (B) (C) (D)
18. (A) (B) (C) (D)
19. (A) (B) (C) (D)
20. (A) (B) (C) (D)

Multiple Choice Questions (MCQ): 70 points

1. Select the correct answer. Using the production method, we compute GDP as

    (a) The sum of value added in the domestic economy.

    (b) The sum of labor and capital income plus profits.

    (c) The sum of final expenditures.

    (d) All of the above.

2. One rule for computing GDP is to use market prices to value goods. Many goods, however, are not sold in the market. This is the case for public goods (e.g., services by a police officer). How do we price these goods in GDP calculations?

    (a) We use the prices seen in other similar countries for these goods.

    (b) We value them at cost.

    (c) We omit them from GDP calculations.

    (d) None of the above.

3. Why do statistical agencies worldwide compute real GDP today using chain weights rather than constant prices?

    (a) To solve the weighting problems associated with current prices.

    (b) To solve the weighting problems associated with base prices.

    (c) All of the above.

    (d) None of the above.

4. How is the consumer price index (CPI) calculated?

    (a) Using only base prices and the current basket of goods and services.

    (b) Using current and base prices and the current basket of goods and services.

    (c) Using current and base prices and a fixed basket of goods and services.

    (d) Using only base prices and a fixed basket of goods and services.

5. Which of the following is true about market power?

    (a) When a firm charges a markup over marginal cost, it has monopoly power.

    (b) When a firm marks down the marginal product of a factor or an input, it has monopsony power.

    (c) All of the above.

    (d) None of the above.

6. Consider the consumption function $C(Y-T) = C_{\min} + \gamma(Y-T)$, where Y is income and T is taxes. What is the marginal propensity to consume (MPC)?

   (a) $C_{\min}$.

   (b) γ.

   (c) $\gamma(Y-T)$.

   (d) None of the above.

7. Why is core inflation often considered a better indicator of ongoing inflation trends?

   (a) Because it excludes volatile food and energy prices.

   (b) Because it adjusts the consumer price index (CPI) for substitution bias.

   (c) Because it incorporates new goods introduced into the CPI.

   (d) Because it accounts for changes in consumer spending habits.

8. The nominal interest rate is equal to the real interest rate _____ the inflation rate.

   (a) Divided by.

   (b) Times.

   (c) Minus.

   (d) Plus.

9. Which of the following facts is NOT a Kaldor fact?

   (a) Growth of labor productivity is constant over time.

   (b) Growth of capital per worker is constant over time.

   (c) The real interest rate decreases over time.

   (d) There is substantial variation in GDP growth rates among the world's fastest growing countries (in the order of 2–5 percentage points).

10. The percentage change in nominal GDP (PY) is approximately the percentage change in prices _____ the percentage change in output.

    (a) Divided by.

    (b) Times

    (c) Plus.

    (d) Minus.

11. Which of the following provides a better depiction of the US economy today?

    (a) Consumption accounts for about 50% GDP, investment for 30%, government spending for 20%.

    (b) Consumption accounts for about 60% GDP, investment for 10%, government spending for 30%.

    (c) Consumption accounts for about 70% GDP, investment for 18%, government spending for 18%.

    (d) Consumption accounts for about 40% GDP, investment for 30%, government spending for 30%.

12. Is there any economic growth in the Solow model without technological progress?

    (a) NO, technological progress is the only source of economic growth.

    (b) YES, during the transition phase to the steady state.

    (c) YES, there is always economic growth.

    (d) YES, only when the economy reaches the steady state.

13. Using the expenditure method, we can calculate GDP in a closed economy according to $Y = C + I + G$, where C, I, and G are aggregate consumption, investment, and government spending, respectively. Which of the following statements is true?

    (a) Increasing government spending causes GDP to rise.

    (b) Increasing consumption causes GDP to rise.

    (c) Aggregate income—that is, GDP—is used for consumption, investment, and government spending.

    (d) All of the above.

14. What is the source of sustained (long-run) growth in the Solow model?

    (a) Capital accumulation.

    (b) Technological progress.

    (c) Population growth.

    (d) All of the above.

15. The golden rule of savings is the savings rate that:

    (a) Minimizes steady-state investment per capita.

    (b) States savings should be as high as possible.

    (c) Maximizes steady-state income per capita.

    (d) Maximizes steady-state consumption per capita.

16. Suppose the states of TX and FL are structurally similar—that is, they have the same savings rate, population growth rate, depreciation rate, level of technology, and so on—but TX is initially richer than FL—that is, TX has a higher initial level of capital per worker. What are the predictions of the Solow model?

    (a) FL grows faster than TX and both states reach the same steady state.

    (b) TX grows faster than FL and both states reach the same steady state.

    (c) FL grows faster than TX and FL reaches a lower steady state.

    (d) TX grows faster than FL and TX reaches a higher steady state.

17. If the elasticity of substitution between capital and labor is one, then

    (a) Capital and labor can be perfectly substituted.

    (b) If the relative price of capital increases by 10%, the capital-labor ratio will decrease by 10%.

    (c) If the relative price of capital increases by 10%, the capital-labor ratio will adjust by 1%.

    (d) None of the above.

18. What of the following is true about factor shares?

    (a) Crucially depend on the returns to scale in production and the nature of competition in both input and output markets.

    (b) With perfect competition, the profit share is zero.

    (c) With constant returns to scale, the profit share is zero.

    (d) All of the above.

19. What of the following is true about the US labor share?

    (a) It has been roughly constant at around 70% in the past 50 years.

    (b) It has increased by 8 percentage points, until reaching 67% in 2023.

    (c) It has decreased by 8 percentage points, until reaching 59% in 2023.

    (d) None of the above.

20. According to the Solow model, population growth is bad for economic growth because it reduces output per capita via lower capital-labor ratios. What other economist(s) also suggest that population growth is bad for economic growth?

    (a) Malthus.

    (b) Romer and Kremer.

    (c) All of the above.

    (d) None of the above.

Short–Answer Questions (Solow's Model): 30 points

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Hawaii produces output according to $Y_t = AK_t^\alpha L_t^{1-\alpha}$, where $A > 0$ is the level of technology, $0 < \alpha < 1$ is the capital share, L is population/workers, K is the aggregate capital stock, and $t = 0, 1, 2, \ldots$ denotes time. The residents of Hawaii save a constant fraction $0 < s < 1$ of their income Y_t, and invest the rest in physical capital, which in the aggregate evolves according to $K_{t+1} = (1-\delta)K_t + I_t$, where $0 < \delta < 1$ is the depreciation rate, and I_t is investment. Hawaiians are born with some initial level of capital $K_0 > 0$ and with a population $L_0 > 0$ which grows at constant rate $n > 0$ each year.

RECOMMENDED NOTATION:

- Use upper-case letters to denote aggregate variables:

  - Y: Aggregate output
  - K: Aggregate capital
  - L: Aggregate labor

- Use lower-case letters with tildes to denote per-capita variables:

  - $\tilde{y} = \frac{Y}{L}$: Output per capita
  - $\tilde{k} = \frac{K}{L}$: Capital-labor ratio

- Use g_x to denote the growth rate of variable x. Eg, $g_x = \frac{\Delta x_{t+1}}{x_t}$

Answer the following questions, *clearly showing your derivations and using the recommended notation*:

1. **Decompose the growth rate of aggregate output into the contributions of technology, capital, and labor.**

2. **Transform the production function to per-capita terms, $\tilde{y}_t = f(\tilde{k}_t)$.**

3. **Make a graph that contains the *per-capita* production function and the investment function. Display the following objects: output, investment, and consumption per capita. Clearly indicate what each axis is.**

4. **Transform the aggregate capital's low of motion to per capita terms.**
   Hints: (i) Start from $\tilde{k}_t = K_t/L_t$ and use one math "trick" that we learned in class.
   (ii) Let your final equation have $\frac{\Delta \tilde{k}_{t+1}}{\tilde{k}_t}$ in the left-hand side.

5. Is the growth rate of capital per worker increasing or decreasing in the level of capital per worker?

6. Derive the steady-state values of capital per worker, output per worker, and consumption per worker. What makes a country richer in the model?