You have 50 minutes to complete the 100 points worth exam. Make sure you show all your work so you can get partial credit. If you get stuck in a problem, make an assumption (reasonable), indicate it clearly, and continue with the problem. Before beginning the exam, please verify that you have 7 pages with 22 questions in your exam booklet. Good luck!

Multiple Choice (each 3 points)

1. In 2018, the largest component of GDP was:
   a. consumption
   b. investment
   c. government purchases
   d. exports
   e. imports

2. Which of the following is the best example of frictional unemployment?
   a. Mary is seeking a job as a nurse, but the high union wages in the industry have limited the number of jobs available.
   b. Alan is willing to work at the going wage, but there are no jobs available.
   c. John searches for a new job after voluntarily moving to New York City.
   d. Susan is willing to work for less than the minimum wage, but employers cannot hire her.
   e. Henry Ford decides to increase pay to $5 per day, but cannot hire as many workers as before due to the wage that is higher than the market wage.

3. When studying the short-run behavior of the economy an assumption of ______ is more plausible, in contrast to studying the long-run equilibrium behavior of an economy, when an assumption of ______ is more plausible.
   a. inflation; unemployment
   b. unemployment; inflation
   c. sticky prices; flexible prices
   d. flexible prices; money neutrality
   e. flexible prices; sticky prices

4. In the neoclassical model with fixed income, if there is a decrease in taxes with no change in government spending, then public saving ______, private saving ______, and national saving ______.
   a. decreases; increases; increases
   b. decreases; decreases; decreases
   c. increases; increases; does not change
   d. decreases; does not change; decreases
   e. decreases; increases; decreases
5. A woman marries her butler. Before they were married, she paid him $60,000 per year. He continues to wait on her as before (but as a husband rather than as a wage earner). She earns $1,000,000 per year both before and after her marriage. The marriage:
   a. increases GDP by more than $60,000.
   b. decreases GDP by $60,000.
   c. does not change GDP.
   d. increases GDP by $60,000.
   e. increases GDP but by less than $60,000.

6. Money that has no value other than as money is called ______ money.
   a. commodity
   b. government
   c. intrinsic
   d. fiat
   e. worthless

7. The demand for real money balances is generally assumed to:
   a. increase as real income increases.
   b. decrease as real income increases.
   c. increase as real interest rate increases.
   d. decrease as real interest rate decreases.
   e. be constant.

8. According to the classical theory of money, inflation does not make workers poorer because wages increase:
   a. more slowly than the overall price level.
   b. in real terms during periods of inflation.
   c. in nominal and not real terms.
   d. in proportion to the increase in the overall price level.
   e. faster than the overall price level.

9. In the classical model, what adjusts to eliminate any unemployment of labor in the economy?
   a. the real interest rate
   b. the nominal interest rate
   c. the real rental price of capital
   d. the average price level
   e. the real wage

10. In 2018, the GDP of the United States totaled about:
    a. $21 billion.
    b. $21 trillion.
    c. $210 billion.
    d. $16 trillion.
    e. $100 trillion
11. Components of the consumption category (C) of GDP are:
   a. business consumption, residential fixed consumption, and inventories
   b. spending on goods, services, and purchases of new homes.
   c. spending on durable goods, non-durable goods, and services.
   d. federal spending, state spending, and local spending
   e. purchases by foreign households of domestically produced goods

12. In the classical model with fixed income, a reduction in the government budget deficit will lead to a:
   a. higher growth rate of the economy.
   b. lower real interest rate.
   c. higher level of output.
   d. lower level of output.
   e. higher real interest rate.

13. All of the following policies were adopted by government in an attempt to reduce the natural rate of unemployment except:
   a. public retraining programs.
   b. the Illinois bonus program for unemployment insurance claimants who found jobs quickly.
   c. diminish the influence of unions.
   d. unemployment insurance.
   e. government employment agencies.

14. If one looks at the relationship between inflation and money growth across countries, countries where money supply grows faster experience __________ rate of inflation, while if one looks at the relationship between money inflation and money growth in the US across time, periods with relatively higher money growth rate are also periods of relatively __________ inflation.
   a. higher, unchanged
   b. higher; lower
   c. lower; higher
   d. lower; lower
   e. higher; higher

15. All of the following actions increase government purchases of goods and services except the:
   a. city of Boston's buying a library book.
   b. federal government's buying a Patriot missile.
   c. federal government's sending a paycheck to the president of the United States.
   d. City of Delaware repaves Sandusky St.
   e. federal government's sending a Social Security check to Betty Jones.
Short Answers

16. **Key Concepts (6 points)** Explain the following terms:
   a. GDP deflator
   b. Money neutrality
   c. Inverted yield curve

17. **CPI (2 points)** Describe one way how CPI may overstate true inflation.

18. **Cobb-Douglass (9 points)** Assume that the production function in Albania is given by $Y = AK^{0.5}L^{0.5}$, where $Y$ is GDP, $K$ is capital stock, and $L$ is labor. Assume that the productivity parameter $A$ equals 5, capital is 16, and labor is 25.
   a. (3 points) What is the value of $Y$?
   b. (3 points) What is the value of the real wage rate?
   c. (3 points) If Albania experiences a devastating earthquake and half of its capital stock is destroyed, what will happen to the real wage rate in Albania (it is enough to indicate whether it increases, decreases, or does not change)?
19. **Money and Inflation** *(10 points)* In Canada, the velocity of money is constant. Real GDP grows at 1.5% per year, the money supply grows at 3.5% per year, and the nominal interest rate in Canada is 5%.
   a. *(3 points)* What is the inflation rate in Canada?

   b. *(3 points)* What is the real interest rate in Canada?

   c. *(3 points)* Suppose Canada suddenly experiences an economic boom and the growth rate of real GDP increases to 4% per year. If the Bank of Canada (Canadian central bank) wants to keep inflation at the same rate as in part (a), what does it need to do? How can it accomplish this *(be specific about a policy)*?

20. **Unemployment** *(10 points)* In August 2019 the adult population in Ohio was 9,267,000 while 248,000 people were unemployed and 5,630,000 people were employed. In the long-run, 2% of all the employed workers in Ohio get separated from their jobs, while 40% of the unemployed find a job.
   a. *(2 points)* What was the unemployment rate in Ohio in August 2019?

   b. *(2 points)* What was the labor force participation rate in Ohio in August 2019?

   c. *(3 points)* What is the natural rate of unemployment in Ohio?

   d. *(3 points)* Explain why some employers would choose to pay efficiency wages which are higher than market wages. List three reasons.
21. **Hyperinflation** *(10 points)* Although “inflation is always and everywhere a monetary phenomenon,” explain why:
   a. the start of a hyperinflation is typically related to the fiscal policy situation, and
   b. the end of a hyperinflation is usually related to changes in fiscal policy.

22. **Taxes** *(9 points)* Suppose the government decides to decrease taxes in an effort to increase consumer spending and investment in the economy.
   a. Will this plan succeed in accomplishing both goals?
   
   b. In equilibrium, what happens to interest rates as a result of this action?
   
   c. Would you characterize this as a case of fiscal crowding out? Explain.

**Extra Credit**
If you have not missed more than one class since the beginning of the semester, you can answer the question below and earn 3 points extra credit.

23. *All* of the following are considered major functions of money *except* as a:
   a. unit of account.
   b. medium of exchange.
   c. store of value.
   d. way to display wealth.
16.a. **GDP deflator** is an implicit measure of the level or prices of goods and services that are produced domestically. It is calculated as the ratio of nominal to real GDP where the difference between the nominal and real GDP comes from current prices. Inflation can be calculated by taking a percentage change in the GDP deflator.

16.b. **Inverted yield curve** is a case/scenario where long-term interest rates fall below short-term interest rates. In normal times, long term rates are higher as they carry longer maturity and higher risk (more unknowns in the distant future). If, however, markets start expecting a recession, near-term risk may increase so that short-term interest rates rise above the long-term interest rates.

16.c. **Money neutrality** implies that in the long-run any changes in the money supply result in changes in the price level only and that real variables are not impacted by money.

17. Substitution bias: The CPI uses fixed weights, so it cannot reflect consumers’ ability to substitute toward goods whose relative prices have fallen.
Introduction of new goods: The introduction of new goods makes consumers better off and, in effect, increases the real value of the dollar. But it does not reduce the CPI, because the CPI uses fixed weights.
Unmeasured changes in quality: Quality improvements increase the value of the dollar, but are often not fully measured.

18. a. 100; b. 2; c. decreases

19. a. $\pi=2\%$; b. $r=3\%$; increase money growth rate by 2.5% to 6%.
20. a. 4.3%; b. 62.9%; c. 4.76%; d. Here are four reasons: attracting higher quality job applicants; increasing worker effort, reducing “shirking”; reducing turnover, which is costly to firms; improving health of workers *(in developing countries)*

21.a. Hyperinflations frequently begin when governments require additional revenue from seigniorage because tax revenue and/or government borrowing is insufficient to cover government spending. The additional seigniorage is obtained by printing money that leads to hyperinflation.

21.b. Hyperinflations usually end when fiscal policy changes, including tax increases and government spending cuts, are made to eliminate the need for seigniorage and stops the excessive increase in money.

22.
   a. Since, consumption is a function of disposable income \( C(Y-T) \), as \( T \) decreases, disposable income \( Y-T \) increases and consumption increases. But, we also know that \( I = S \) and that \( S=Y-C-G \). Therefore, if \( C \) increases, that will reduce national saving and this will mean that the level of investment will also decrease. Hence, no, this plan will not succeed in accomplishing both goals.

   b. To lower investment in the equilibrium, the interest rate must increase. Since there are less loanable funds in the market (less \( S \)), the price of loanable funds \( r \) will increase.

   c. Yes, the decrease in taxation is like an increase in government consumption. The overall result is a decrease in investment because the government has to borrow more loanable funds due to the decrease in tax revenue.

23. D