For those taking the **GENERAL EXAM** in macroeconomic theory:

1. You have **FOUR** hours.

2. Answer **ALL QUESTIONS** in Parts I, II, III, IV, and V.

   You should spend about 26 minutes on each of Parts I, II, and III, and 80 minutes on each of Parts IV and V.

For those taking the **FINAL EXAMINATION** in Economics 2010d (**not the General Examination**):

1. You have **THREE** hours.

2. Answer **ALL QUESTIONS** in Parts IV and V.

3. **DO NOT ANSWER** the questions in Parts I, II and III.
Part I

True, False or Uncertain? Explain briefly. Explanation determines grade.

1. According to the fixed-price IS-LM model, if the demand for money does not depend on the interest rate, then a $100-billion increase in government spending raises equilibrium income by more than $100 billion.

2. According to the Lucas imperfect information model, a 10 percent contraction in the money supply has a larger effect on output in an economy with normally stable monetary conditions than it does in an economy with normally volatile monetary conditions.

3. According to one standard efficiency-wage theory, firms choose to keep wages below the equilibrium level because poor workers are less likely to shirk than rich ones.

4. According to the Taylor-Rotemberg-Calvo models of time-contingent price adjustment, if a central bank makes a fully credible announcement that the rate of inflation will decline gradually over time, and then carries through on this policy of disinflation, there will be no effect on the level of economic activity.
Part II

Question for Spring 2002 Macro Theory Generals

In recent years many central banks have adopted a monetary policymaking framework that they describe as “inflation targeting.” Some economists have argued that this way of making monetary policy means placing zero weight on all variables other than inflation (for example, on output and employment) in the objective function that the central bank implicitly seeks to maximize. Others have disagreed, noting that since the central bank has only one policy instrument at its disposal (typically a short-term interest rate) the expected path for only one target variable is sufficient to express policymakers’ intended trajectory for all variables that monetary policy might plausibly influence, and that choosing inflation as the one target variable to serve that purpose carries no necessary implication about the weight placed on other potential policy targets.

Given (a) the rate of inflation (assume it is constant) that the central bank says it is targeting, (b) time series data on the usual macroeconomic variables, and (c) time series data on the short-term interest rate that the central bank sets in order to implement its policy, how would you go about estimating empirically the weight that the central bank places on output or employment relative to the weight it places on inflation? How would you specifically test whether the weight on any particular variable other than inflation is zero?

Be explicit about the macroeconomic model that underlies the test you propose, and also about any other assumptions on which your test relies.
Three short (separate) questions (27 minutes in total).

1. Let $x$ represent the size of a tree. Suppose the tree grows $\mu(x)$ units each period. If the agent chops down the tree, the profit to the agent is $x$, the current size of the tree that was chopped down. When the tree is chopped down, a new tree of size 0 is immediately planted at no cost. The agent discounts future profits with per-period discount rate $r$. Write down the (discrete-time) Bellman Equation for this problem.

2. Provide sufficient conditions for the marginal utility of consumption to be a random walk. Your conditions should be weak enough so that consumption itself is not necessarily a random walk.

3. Suppose that firms face no fixed costs of adjusting their capital stock. Will such firms necessarily adjust their actual capital stock in response to infinitesimal changes in their target capital stock? Explain your reasoning.
Questions for Macro General Examination, May 2002

1. Solow growth model and endogenous growth (40 minutes)

   A. Consider the standard Solow growth model with a neoclassical production function, no population growth, and no technological progress. The depreciation rate on capital is \( \delta > 0 \) and the gross saving rate is \( s \) (0<\( s < 1 \)). Explain why the economy cannot grow forever by accumulating capital.

   B. Suppose that, instead of being governed by a neoclassical production function, production exhibits constant returns to scale in capital, for given labor. (Capital might be construed broadly to include human capital.) Is it then possible for the economy described in part A. to grow forever? Explain.

   C. Suppose that, instead of being governed by a neoclassical production function, production involves an array of intermediate inputs (which might be durable or non-durable). Assume that, for given labor, the new production function exhibits constant returns to scale in \( N \), the number of varieties of intermediates, and the quantity of each type of intermediate input. Suppose further that \( N \) can be increased through a lump-sum outlay on research and development (R&D). Is it then possible for the economy described in part A. to grow forever? Explain.

2. Ricardian equivalence and the real-balance effect (40 minutes)

   A. Consider the standard Ramsey growth model with no population growth and no technological progress. Suppose that the quantity of real government bonds is \( B(t) \). The government imposes lump-sum real taxes in the amount \( T(t) \). These taxes and new bond issues are used to finance real government expenditures, \( G(t) \), and interest payments. The full time path of \( G(t) \) is given. How do the initial debt level, \( B(0) \), and the subsequent path of the public debt affect the economy’s steady-state capital intensity and real interest rate? What did you assume about the long-run behavior of the public debt?

   B. Consider again the standard Ramsey growth model with no population growth and no technological progress. Suppose that the nominal quantity of paper money, issued by the government, is \( M(t) \). The proceeds from new money creation are given to households as lump-sum transfers. Household utility depends (as in Sidrauski’s model) positively on real money balances, \( M(t)/P(t) \). Suppose that \( M(t) \) and \( P(t) \) are growing at the same rate \( \pi \). How does the level of \( \pi \) affect the economy’s steady-state capital intensity and real interest rate?

   C. Comment on the relation of the results in part A. to those in part B.
Part V
General Exam Questions
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These two questions will receive equal weight in the grade.

1. Consider a closed economy in which a large government deficit is sharply reduced. Discuss what you expect to happen in the short run to: GDP growth, private consumption, private investment.

2. Consider an economy described by the following expression for output, where $y_t$ is output, $\pi_t$ is inflation and $\pi_t^e$ is expected inflation; and $\bar{y} > 0$

$$y_t = \bar{y} + \pi_t - \pi_t^e + \varepsilon_t$$

$\varepsilon_t$ is an i.i.d. shock with mean zero and variance $0 < \sigma^2_\varepsilon < \infty$. The social costs are:

$$L = \frac{1}{2}(\pi_t - c)^2 + \frac{b}{2}(y_t - k)^2$$

where $c > 0$, $k > \bar{y}$.

The timing is as follows: first $\pi_t^e$ is set, then $\varepsilon_t$ is publicly observed, then $\pi_t$ is chosen.

a) Find the time consistent inflation rate and the optimal inflation rate.

b) Discuss the pros and cons of the following monetary arrangements:
   i) a “conservative” Central Banker;
   ii) a simple rule $\pi_t = c$;
   iii) adoption of a foreign currency.

c) How would you rank the three options above?