Midterm Solution Key  
Economics 101(a)  (Fall 2005)  
Version 2  (MC#1 starts “The GDP deflator…”)

Regrade policy: If you would like your test regraded, please submit a written statement to explain why. Your entire test will be regraded, so there is a possibility that points could be lost rather than gained.

Multiple Choice:
1) a  2) d  3) c  4) b  5) a  6) b  7) c  8) d  9) c  10) a

Problem 1: Neoclassical Model

\[
Y^s = 20 \times 100^{1/2} \times 100^{1/2} = 20 \times 100 \quad Y = 2000.
\]

\[
Y^d = C + I + G = [200 + 0.5(2000-200)] + [800 - 1000r] + 400
\]

setting \( Y^s = Y^d \): 2000 = 2300 – 1000r

so -300 = -1000r so \( r = 0.30 \) or 30%

I = 800 - 1000r = 800 - 1000(0.30) I= 500

and C = 200 + 0.50(2000-200) = 1100.


Real wage = MPL = 10(L/K)^{1/2} =10(100/100)^{1/2} \quad W/P=10

\[
M^*10 = P*Y, \quad so \quad P = M^*10/Y = 800*10/2000 \quad P = 4
\]

Nominal GDP = P *Y = 4*2000 =8000

W = W/P * P = 10 * 4 \quad W=40

The key equilibrium condition in the goods/financial are supply of goods equals demand: \( Y = C+I+G \). This can also be written as saving = investment, from the perspective of the financial market. The interest rate adjusts so that the demand for loanable funds (for investment) in the financial market equals the supply (saving).

b) A rise in T causes r to fall, I to rise, sp fall, national saving to rise (a,b,a,b)

Explanations: The rise in taxes lowers consumers’ disposable income, so it lowers their consumption. This raises national saving, meaning there is an excess supply of loanable funds. To make investment absorb this, the interest rates must fall.

c) A fall in labor causes a rise in the MPL and hence in the real wage, a fall in real GDP; nominal GDP is constant since it equals M*V which are constant, a rise in the price level which equals MV/Y where Y is falling. (a,b,c,a)

d) A cut in M will cause P to fall, real GDP not to change, nominal GDP and nominal wage to fall (b,c,b,b)

e) The classical dichotomy says that changes in nominal variables do not affect real variables, but only other nominal variables (like price level, nominal GDP, nominal rental rate). This is true above. In part d, the change in money supply only affects nominal variables. Note that section e does not violate this property: although this section shows that a change in real variables is affecting nominal variables, effects going from real to nominal are consistent with the classical dichotomy. It just rules out effects going the one direction, from nominal to real.
Problem 2: Solow Growth Theory

a) steady state: \( s f(k^*) = (\delta+n) k^* \)
\[
0.15 \times 10k^{*1/2} = 0.15k^*
\]
\[
10k^{*1/2} = k^*
\]
\[
k^{*1/2} = 10 \quad \text{so} \quad k^* = 100
\]
\[
y^* = 10k^{*1/2} = 10 \times 10 \quad \text{so} \quad \text{GDP} = 100 \quad \text{in steady state.}
\]
\[
c^* = (1-s)y^* = 0.85 \times 100 \quad \text{so} \quad \text{consumption} = 85 \quad \text{in steady state.}
\]
Real rental rate = MPK = \( 5k^{*-1/2} = 5/10 = 0.50. \)

b) The higher saving rate supports more capital in steady state, so \( y^* \) rises. At the golden rule, we know consumption is the highest possible, so \( c^* \) rises. With more capital per person, the MPL (\( 5k^{*1/2} \)) rises, but the MPK (\( 5k^{*-1/2} \)) falls. (b, a, a)

c) A lower population growth rate will lead to a higher steady state level of capital and income per person:
\[
k^* = \left( \frac{SA}{\delta + n} \right)^{1-\alpha}; \quad \text{and output:} \quad y^* = 10k^{*1/2} = 10 \left( \frac{SA}{\delta + n} \right)^{1/(2-\alpha)}
\]
\[
c^* = 0.88 y^* = 8.8k^{*1/2} = 8.8 \left( \frac{SA}{\delta + n} \right)^{1/(2-\alpha)}
\]
The higher capital stock indicates a higher real wage (MPL) and lower real rental rate (MPK). (b, a, a)

d) total output grows at rate \( n+g = 5\% \)
output per person grows at rate \( g = 3\% \)
real rental rate does not grow in steady state.
real wage grows at rate \( g = 3\% \)
(a,b,d,b)

e) Three of the following:
- raise government saving by cutting government budget (raise taxes or lower spending)
- raise private saving with tax incentives (sales taxes, lower income taxes, deductions for IRAs)
- industrial policy to direct saving to useful investment projects
- encourage technological progress (patent laws, grants for research)
The U.S. has a problem with low saving, so the first two items above are especially helpful. A case could also be made for encouraging technological progress. Industrial policy is harder to argue for, due to political favoritism and the difficulty in picking the right sectors.