

## Midterm 1 Solution Key Economics 105 (Fall 2003)

**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.

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### Multiple Choice:

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

### Problem 1:

a) Note that  $Y = 5K^{0.3}L^{0.7} = 4(150)^{1/3}(150)^{2/3} = 600$

Using the equilibrium condition for goods market, we can obtain:

$$Y = C + I + G$$

$$600 = 20 + 0.6(600-100) + 300 - 1000r + 100$$

$$-120 = -1000r, \text{ which implies that } r = 0.12.$$

Investment:

$$I = 300 - 1000(0.12) = 180.$$

Private saving:

$$Y - T - C = 600 - 100 - (20 + 0.6(600-100)) = 180.$$

$$\text{Real wage: } (W/P) = \text{MPL} = f_L(K, L) = 2.8(K/L)^{0.3} = 2.8(150/150)^{0.3} = 2.8$$

- b) investment rises  
private saving falls  
real interest rate falls  
real wage does not change

The rise in taxes raises overall saving in the economy, because the rise in government surplus (T-G) exceeds the fall in private saving. The excess supply of loanable funds in the financial market requires a fall in the interest rate, to encourage extra borrowing for investment to make use of the extra loanable funds.

- c) investment falls  
private saving falls  
real interest rate rises  
real wage rises

A fall in income lowers total national saving ( $Y - C(Y-T) - G$ ), because consumption falls less than the fall in income. This means there is a shortage of loanable funds in the financial market, requiring a rise in the real interest rate to allocate the scarce supply to fewer investment projects. The real wage raises because a fall in L raises the MPL of the marginal worker.

### Problem 2:

a) The golden rule capital per worker can be derived from the golden rule condition:

$$\text{MPK} = \delta \text{ or } 0.4k^{-1/2} = 0.2. \text{ So, } k^*_{\text{gold}} = (2)^2 = 4$$

$$\text{Consumption then will be: } c = f(k) - \delta k = 0.8(4)^{1/2} - 0.2(4) = 1.6 - 0.8 = 0.8.$$

- b) A positive population growth rate means there is an additional cost to maintaining a level of capital stock in steady state. So the maximum level of consumption per person falls.