

Midterm 1 Solution Key

Economics 105 (Fall 2000)

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

Problem 1: Neoclassical Model

- a) $Y^d = C + I + G = [500 + 0.60(8000-3000)] + [2000 - 5000r] + 3000$
setting $Y^s = Y^d$: $8000 = [500 + 0.60(8000-3000)] + [2000 - 5000r] + 3000$
so $-500 = -5000r$ so $r = 0.10$
and $I = 2000 - 5000r = 2000 - 5000(0.10) = 1500$
- b) The tax cut lowers government saving (taxes minus government purchases).
Consumption rises because the tax cut raises disposable income. But because the marginal propensity to consume is less than one, the rise in disposable income is larger than the rise in consumption, so private saving rises.
Total saving is income less consumption less government purchases, so the rise in consumption lowers total saving. This raises the real interest rate in the financial market and convinces firms to lower investment.
- c) Consumption rises because the tax cut raises disposable income.
But because the marginal propensity to consume is less than one, the rise in disposable income is larger than the rise in consumption, so private saving rises.
Since there is no change in government saving by construction, total saving rises with private saving. This lowers the real interest rate and raises investment.
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Problem 2: Solow Growth Theory

- a) steady state condition: $s f(k^*) = (\delta+n) k^*$ so $0.10 \times 10k^{*1/2} = 0.10k^*$ so $k^{*1/2} = 10$ and $\underline{k^* = 100}$
 $c^* = (1-s) f(k^*) = (1 - 0.10) \times 10 \times 100^{*1/2} = 0.9 \times 100 = 90$
- b) golden rule condition: $MPK = \delta+n$ so $5k_{gold}^{*1/2} = 0.10$ so $k_{gold}^{*1/2} = 50$ and $k_{gold}^* = 2500$
Plug this into the steady state condition to find the necessary saving rate:
 $s f(k^*) = (\delta+n) k^*$ so $s_{gold} \times 10(2500)^{1/2} = 0.10(2500)$ so $s_{gold} \times 500 = 250$, so $s_{gold} = 1/2$.
The government could raise taxes or cut purchases to raise government saving.
- c) The real wage will equal the $MPL = 5k^{1/2}$, and the real rental rate will equal $MPK = 5k^{-1/2}$.
(Recall the production function can be rewritten in levels terms as $Y = 10K^{1/2}L^{1/2}$.) So a rise in the level of capital per person will raise the real wage rate and lower the real rental rate on capital.
The share of income paid to workers can be written as $MPL \times L / Y = MPL / y = 5k^{1/2}/(10k^{1/2}) = 1/2$.
The share of income paid to capital owners is $MPK \times K / Y = MPK \times k / y = 5k^{-1/2} \times k / (10k^{1/2}) = 1/2$.
So the shares paid to the workers and capital owners remain unchanged, and they are equal to each other. This suggests that although the real rental rate falls, the larger number of machines owned by the capitalists compensates, and both groups benefit equally from the new policy.
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