Midterm 1 Solution Key – Economics 101
(Spring 2025)

Regrade policy: If you would like your test regraded, please submit a written statement to explain why, within one week of the date the exams are returned to class. Your entire test will be regraded, so there is a possibility that points could be lost rather than gained.

Multiple Choice:

	version A	version B
1	C	D
2	D	A
3	A	B
4	B	C
5	C	A
6	B	C
7	A	D
8	D	B
9	B	D
10	D	C

Problem 1: Neoclassical Model

a) Version A:

$Y^s = 5x100 + 3x200 = 1100$

$Y^d = C + I + G = [150 + 0.5(1100 - 300)] + [600 - 1000r] + 100$

setting $Y^s = Y^d$: $1100 = 1250 - 1000r$

so $-150 = -1000r$ so $r = 0.15$

Version B:

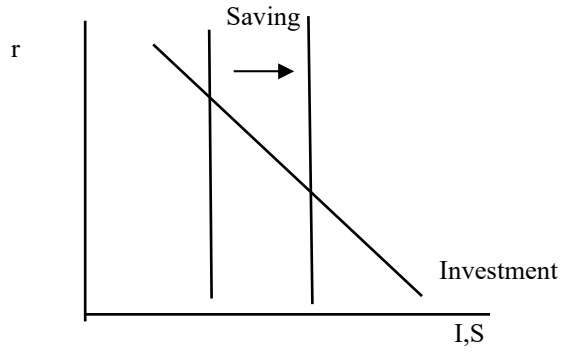
$Y^s = 4x100 + 3x200 = 1000$

$Y^d = C + I + G = [100 + 0.5(1000 - 200)] + [600 - 2000r] + 100$

setting $Y^s = Y^d$: $1000 = 1200 - 2000r$

so $-200 = -2000r$ so $r = 0.10$

b) Note that the saving line is vertical in this case, because the consumption function above, and hence saving S= Y-C-G, are not affected by the interest rate.



Interest rate falls. The cut in government spending raises national saving, S = Y – C(Y-T) – G and the supply of loanable funds in the financial market. Banks lower the interest rate so that the demand for loanable funds as investment rises to equal the new higher supply.

c)

	version A	version B
11	B	A
12	B	A
13	A	B

Problem 2:

version A:
a) real wage = MPL = (2/3) 15 $K^{1/3}$ $L^{-1/3}$ = 10 * $(K/L)^{1/3}$ = 10 *$(1000/1000)^{1/3}$ = 10
real rental rate = MPK = (1/3) 15 $K^{-2/3}$ $L^{2/3}$ = 5 * $(L/K)^{2/3}$ = 5 *$(1000/1000)^{2/3}$ = 5

Version B:
a) real wage = MPL = (2/3) 12 $K^{1/3}$ $L^{-1/3}$ = 8 * $(K/L)^{1/3}$ = 8 *$(1000/1000)^{1/3}$ = 8
real rental rate = MPK = (1/3) 12 $K^{-2/3}$ $L^{2/3}$ = 4 * $(L/K)^{2/3}$ = 4 *$(1000/1000)^{2/3}$ = 4

b) A rise in L lowers the real wage. Because the production function has decreasing marginal product, a rise in L lowers the marginal product of labor. This lowers the real wage since it is only profitable for the profit-maximizing firms to hire the existing supply of workers if they pay a wage equal to the marginal product of labor.

c) A fall in capital lowers the marginal product of labor so it lowers the real wage; it raises the marginal product of capital so it raises the real rental rate.
(below for numbers in version A)
Total payments to capital = MPK x K = 4 $K^{-2/3}$ $L^{2/3}$ x K =4 $K^{1/3}$ $L^{2/3}$. This falls with a fall in K.
The capital share equals MPK x K / Y = 4 $K^{1/3}$ $L^{2/3}$/ Y = 4 $K^{1/3}$ $L^{2/3}$/ (12 $K^{1/3}$ $L^{2/3}$) = 4/12 =1/3 which is constant

	version A	version B
14	A	B
15	B	A
16	C	B
17	B	C

Problem 3:

a.i) Version A:

$$sf(k) = (\delta + n)k$$

$$0.1*2k^{1/2} = 0.2k$$

$$1 = k^{1/2}$$

$$k = 1$$

Version B

$$sf(k) = (\delta + n)k$$

$$0.1 * 2k^{1/2} = 0.1k$$

$$2 = k^{1/2}$$

$$k = 4$$

ii) Version A

$$MPK = \delta + n$$

$$(1/2) * 2k^{-1/2} = 0.2$$

$$k^{-1/2} = 0.2$$

$$k^{1/2} = 5$$

$$k = 25$$

Version B:

$$MPK = \delta + n$$

$$(1/2) * 2k^{-1/2} = 0.1$$

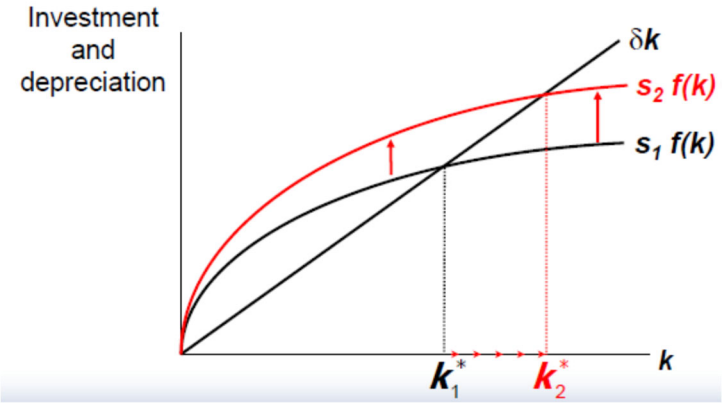
$$k^{-1/2} = 0.1$$

$$k^{1/2} = 10$$

$$k = 100$$

iii) When the actual steady state capital stock is lower than the golden rule capital stock, this means that the benefit of raising the level of steady state capital (MPK) is greater than the cost (depreciation rate), so that steady state consumption could be higher. The economy's saving rate is too low to achieve the golden rule.

b)



c)

	version A	version B
18	A	B
19	B	A
20	A	B