Answers to Preparation Questions for Exam #2

1. *A Model of Income Determination: Use the following information to answer parts a – e where Y is aggregate income/output, Y^d is disposable income, C is consumption, I is investment, G is government spending, and (X – IM) is net exports.*

$$Y = C + I + G + (X - IM)$$
$$Y^d = (1 - 0.25) \times Y$$
$$C = 300 + 0.85 \times Y^d$$
$$I = 550$$
$$G = 350$$
$$(X - IM) = 50 - 0.05 \times Y^d$$

a. *What is equilibrium output, consumption, and net exports for the given data?*

Substitute in the values for C, I, G, (X – IM), and Y^d into the income identity:

$$Y = 300 + 0.85\times(1 - 0.25)\times Y + 550 + 350 + 50 - 0.05\times(1 - 0.25)\times Y$$
$$Y = 1{,}250 + 0.80\times 0.75\times Y$$
$$Y = 1{,}250 + 0.60\times Y$$
$$0.40\times Y = 1{,}250$$
$$Y = 1{,}250/0.40$$
$$Y^{**} = 3{,}125.$$

The values for consumption and net exports are

$$C^{**} = 300 + 0.85\times(1 - 0.25)\times Y^{**}$$
$$C^{**} = 300 + 0.85\times 0.75\times 3{,}125$$
$$C^{**} = 300 + 1{,}992.19$$
$$C^{**} = 2{,}292.19.$$

$$(X - IM)^{**} = 50 - 0.05 \times (1 - 0.25) \times Y^{**}$$
$$(X - IM)^{**} = 50 - 0.05 \times 0.75 \times 3{,}125$$
$$(X - IM)^{**} = 50 - 117.19$$
$$(X - IM)^{**} = -67.19.$$

b. *Calculate private savings, government savings and direct foreign investment.*

Private savings: $S_p = Y^d - C^{**}$

$$S_p = (1 - 0.25) \times Y^{**} - C^{**}$$
$$S_p = 0.75 \times 3{,}125 - 2{,}292.19$$
$$S_p = 3{,}343.75 - 2{,}292.19$$
$$S_p = 51.56.$$

Government savings: $S_g = t \times Y^{**} - G$

$$S_g = 0.25 \times 3{,}125 - 350$$
$$S_g = 781.25 - 350$$
$$S_g = 431.25.$$

Direct foreign investment: $S_w = -(X - IM)$**

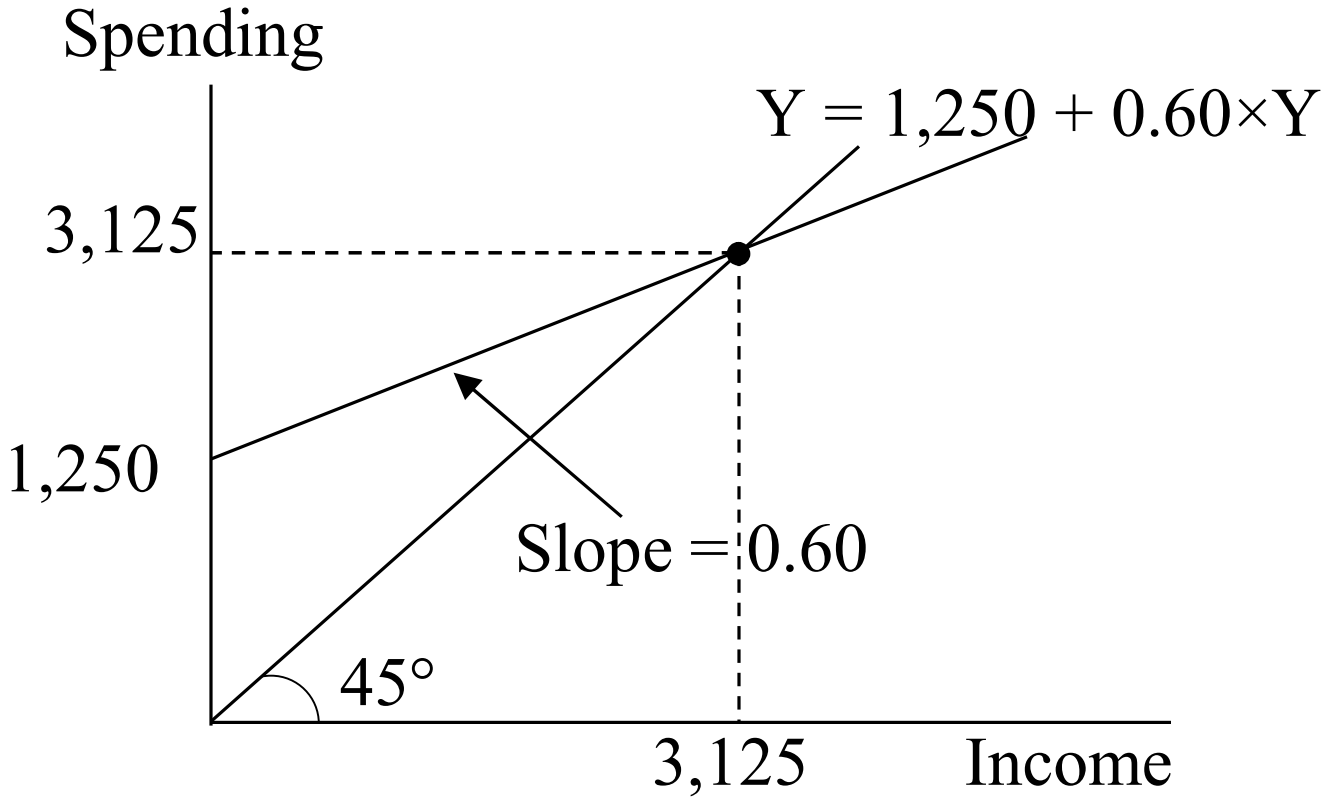
$$S_w = 67.19.$$

c. *What change in government spending is required to increase equilibrium output by $500?*

Calculate the change in government spending?

$$\Delta Y = [1/(1 - (b - m)\times(1 - t))]\times\Delta G$$
$$500 = [1/(1 - (0.85–0.05)\times(1 - 0.25))]\times\Delta G$$
$$500 = [1/(1 - 0.80\times0.75)]\times\Delta G$$
$$500 = [1/(1 - 0.60)]\times\Delta G$$
$$500 = [1/0.4]\times \Delta G$$
$$\Delta G = 500\times0.4$$
$$\Delta G = 200.$$

d. *Draw the income-spending graph for this model. Be sure to include equation, the intercept, the slope of the pending line, and the equilibrium level of output on the graph.*



2. *The IS Curve Equation*: *Use the information below for parts a – c.*

Autonomous consumption	$80
Autonomous exports	380
Autonomous imports	30
Autonomous investment	920
Government spending	370
Interest sensitivity of exports	3,000
Interest sensitivity of imports	2,000
Interest sensitivity of investment	5,000
Marginal income tax rate	0.25
Marginal propensity to consume	0.88
Marginal propensity to import	0.12

a. *What are the consumption, investment, and net exports functions for the given data?*

The consumption function is

$$C = a + b \times (1 - t) \times Y$$
$$C = 80 + 0.88 \times (1 - 0.25) \times Y$$
$$C = 80 + 0.66 \times Y.$$

The investment function is

$$I = e + d \times R$$
$$I = 920 + 5{,}000 \times R.$$

The net exports function is

$$(X - IM) = (g_X - g_{IM}) - (n_X + n_{IM}) \times R - m \times (1 - t) \times Y$$
$$(X - IM) = (380 - 30) - (3{,}000 + 2{,}000) \times R - 0.12 \times (1 - 0.25) \times Y$$
$$(X - IM) = 350 - 5{,}000 \times R - 0.09 \times Y.$$

b. *Write the equation for the IS curve for this data.*

Substitute in the consumption, investment, and net exports functions and the value of G into the income identity:

$$Y = C + I + G + (X - IM)$$
$$Y = 80 + 0.66 \times Y + 920 - 5{,}000 \times R + 370 + 350 - 5{,}000 \times R - 0.09 \times Y$$
$$Y = 1{,}720 + 0.57 \times Y - 10{,}000 \times R.$$

c. *Find the slope of the IS curve in part b.*

$$Y = 1{,}720 + 0.57 \times Y - 10{,}000 \times R$$
$$10{,}000 \times R = 1{,}720 - 0.43 \times Y$$
$$R = (1{,}720 - 0.43 \times Y)/10{,}000.$$

The slope of the IS curve is – 0.000043.

5. *Solving the IS-LM Model*: *Use the information below for parts a – c.*

Autonomous consumption	$88
Autonomous exports	1,000
Autonomous imports	766
Autonomous investment	1,490
Government spending	1,500
Interest sensitivity of exports	2,500
Interest sensitivity of imports	2,500
Interest sensitivity of investment	3,000
Interest sensitivity of money demand	20,000
Marginal income tax rate	0.20
Marginal propensity to consume	0.90
Marginal propensity to import	0.05
Money supply	13,500
Output sensitivity of money demand	1
Price level	1.5

a. *Find the equilibrium values of output and the interest rate.*

The income identity and the consumption, investment, and net exports functions are

$$Y = C + I + G + (X - IM)$$
$$C = 88 + 0.90\times(1 - 0.20)\times Y$$
$$I = 1{,}490 - 3{,}000\times R$$
$$(X - IM) = (1{,}000 - 766) - (2{,}500 + 2{,}500)\times R - 0.05\times(1 - 0.20)\times Y.$$

Combine these four equations to get the IS curve equation:

$$Y = 88 + 0.72\times Y + 1{,}490 - 3{,}000\times R + 1{,}500 + 234 - 5{,}000\times R - 0.04\times Y$$
$$Y = 3{,}312 + 0.68\times Y - 8{,}000\times R$$
$$8{,}000\times R = 3{,}312 - 0.32\times Y$$
$$2.5\times(8{,}000\times R) = 2.5\times(3{,}312 - 0.32\times Y)$$
$$20{,}000\times R = 8{,}280 - 0.80\times Y.$$

The M^D/M^S equation is the LM curve equation:

$$M^S = (k \times Y - h \times R) \times P$$
$$13{,}500 = (Y - 20{,}000 \times R) \times 1.5$$
$$13{,}500/1.5 = (Y - 20{,}000 \times R)$$
$$20{,}000 \times R = Y - 9{,}000.$$

Combine the equations for the IS and LM curves

$$8{,}280 - 0.80 \times Y = Y - 9{,}000$$
$$1.80 \times Y = 17{,}280$$
$$Y^{**} = 9{,}600.$$

Substituting the value for Y into the LM (or IS curve, not shown), we get

$$20{,}000 \times R = 9{,}600 - 9{,}000$$
$$R^{**} = 600/20{,}000$$
$$R = 0.03 = 3\%.$$

b. *Calculate equilibrium consumption, investment, and net exports.*

Substitute the equilibrium values for Y and R into the consumption, investment, and net exports functions:

Consumption: $C^{**} = 88 + 0.90 \times 0.80 \times Y^{**}$

$C^{**} = 88 + 0.72 \times 9{,}600$

$C^{**} = 88 + 6{,}912$

$C^{**} = 7{,}000.$

Investment: $I^{**} = 1{,}490 - 3{,}000 \times R^{**}$

$I^{**} = 1{,}490 - 3{,}000 \times 0.03$

$I^{**} = 1{,}490 - 90$

$I^{**} = 1{,}400.$

Net exports: $(X-IM)^{**} = 234 - 5{,}000 \times R^{**} - 0.05 \times 0.08 \times Y^{**}$

$(X-IM)^{**} = 234 - 5{,}000 \times 0.03 - 0.04 \times 9{,}600$

$(X-IM)^{**} = 234 - 150 - 384$

$(X-IM)^{**} = -300.$

c. *Compute private savings, government savings, and direct foreign investment.*

Private savings: $S_p = Y^d - C^{**}$

$$S_p = (1 - 0.20) \times Y^{**} - C^{**}$$

$$S_p = 0.80 \times 9{,}600 - 7{,}000$$

$$S_p = 7{,}680 - 7{,}000$$

$$S_p = 680.$$

Government savings: $S_g = t \times Y^{**} - G$

$$S_g = 0.20 \times 9{,}600 - 1{,}500$$

$$S_g = 1{,}920 - 1{,}500$$

$$S_g = 420.$$

Direct foreign investment: $S_w = -(X - IM)^{**}$

$$S_w = 300.$$