Macroeconomics, ECON302 **San Francisco State University**
Michael Bar **Fall 2011**

Midterm Exam

Tuesday, November 1

75 minutes

Name: _____

Instructions

1. This is closed book, closed notes exam.
2. No calculators of any kind are allowed.
3. Show all the calculations.
4. If you need more space, use the back of the page.
5. Fully label all graphs.

Good Luck ☺

1. (40 points). Consider the Classical model studied in class, and briefly described as follows. The consumer derives utility from consumption *C* and leisure *l* according to $U(C,l) = \alpha \ln C + (1-\alpha)\ln l$. He is endowed with *h* hours which he can allocate between leisure and work L_S. The real wage is *w*. The consumer owns a firm and receives dividend income (profit) π. The firm produces output *Y* using technology $Y = AK^{\theta}L_D^{1-\theta}$, where *A* is productivity parameter (TFP), *K* is the capital owned by the firm, and L_D is labor employed by the firm. The government taxes labor income at the rate of t_w and dividend income at the rate of t_π.

   a. Write the consumer's utility maximization problem.

Consumer's problem

$$\max_{C,l} \alpha \ln C + (1-\alpha)\ln l$$

s.t.

$$C = w(h-l)(1-t_w) + \pi(1-t_\pi)$$

   b. Write the firm's profit maximization problem.

$$\max_{L_D} \pi = AK^{\theta}L_D^{1-\theta} - wL_D$$

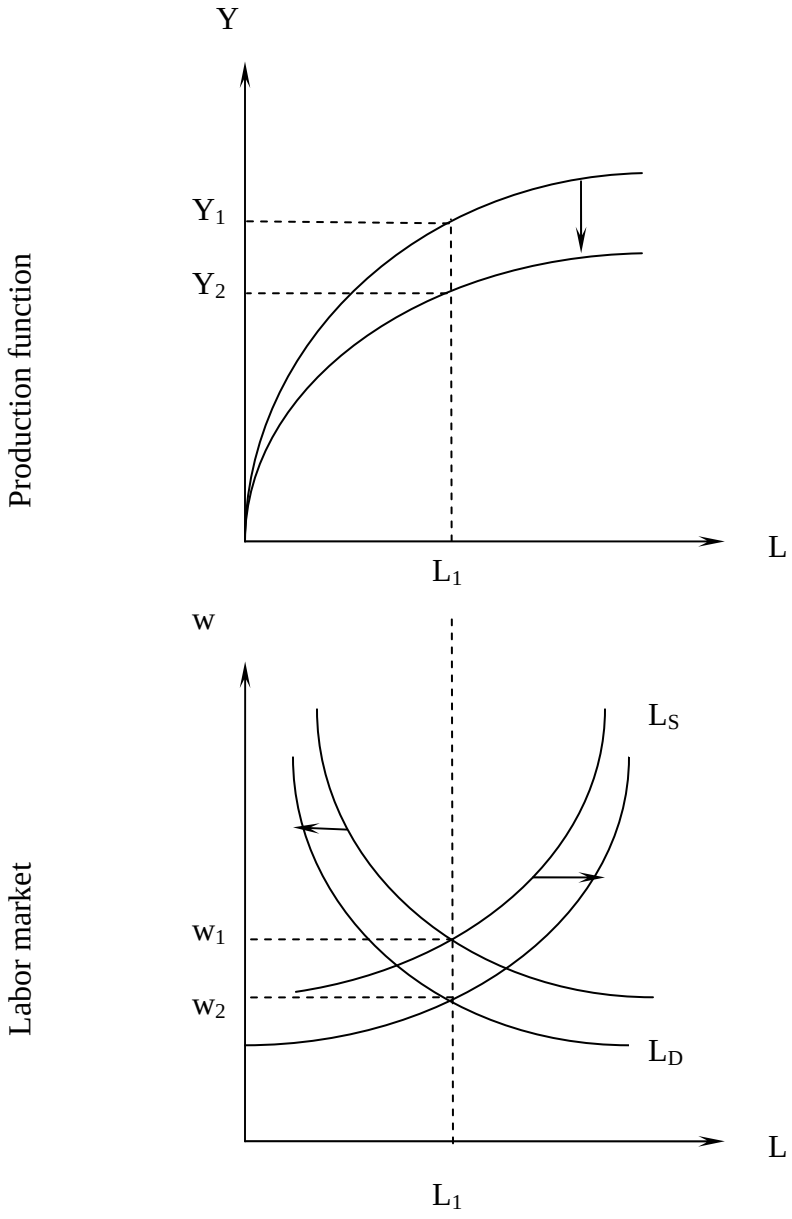
c. Suppose that labor income and dividends are taxed at the same rate $t = t_w = t_\pi = 20\%$. The capital share in the economy is 0.35, equilibrium output is 1000 and equilibrium employment is 40. Find the equilibrium private consumption C^*, government consumption G^*, dividend income π^* and unemployment rate in this economy.

$$C^* = (1-t)Y^* = 0.8 \cdot 1000 = 800$$
$$G^* = tY^* = 0.2 \cdot 1000 = 200$$
$$\pi^* = \theta Y^* = 0.35 \cdot 1000 = 350$$
$$UR^* = 0, \text{ always in this model}$$

d. Now suppose that the government raised the tax rate, and it becomes $t = t_w = t_\pi = 25\%$. Find the new equilibrium output, employment, private consumption, government consumption dividends and the unemployment rate. ($Y^*, L^*, C^*, G^*, \pi^*, UR^*$).

$$Y^* = 1000, \text{ unchanged by } t$$
$$L^* = 40, \text{ unchanged by } t$$
$$C^* = (1-t)Y^* = 0.75 \cdot 1000 = 750$$
$$G^* = tY^* = 0.25 \cdot 1000 = 250$$
$$\pi^* = 350, \text{ unchanged by } t$$
$$UR^* = 0, \text{ always in this model}$$

e. Suppose that the economy of Japan is described by the classical model. Using fully labeled graphs of the production function and labor market, illustrate the effect of destruction of physical capital by a tsunami ($K \downarrow$) on equilibrium output (Y^*), equilibrium real wage (w^*) and equilibrium employment (L^*).



2. (5 points). **"In the classical model the government cannot affect output and employment with fiscal policies"**. This statement is (circle the correct answer):
   a. always true
   b. always false
   c. true if labor and non-labor income are taxed at different rates
   (d.) true if labor and non-labor income are taxed at the same rate

3. (15 points). Consider the Keynesian model discussed in class. Suppose that the economy is characterized by the following behavioral functions:

Consumption: $C = 45 + 0.5(Y - T)$
Investment: $I = 40$
Government spending: $G = 50$
Taxes: $T = 10 + 0.3Y$
Full employment output: $Y_f = 301$

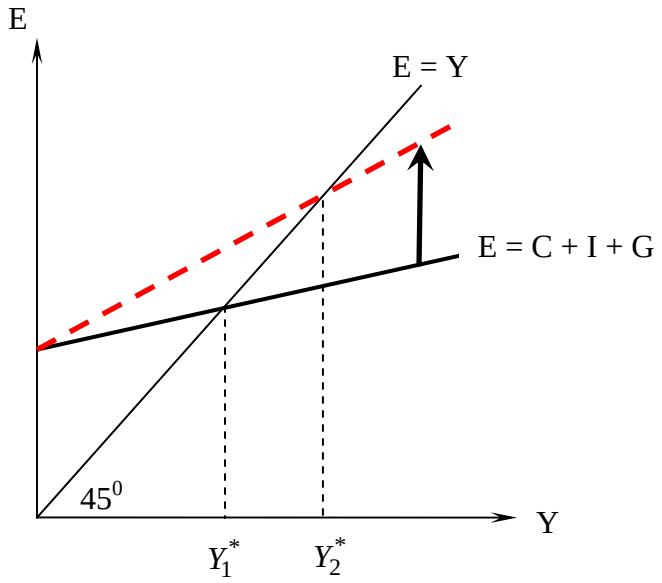
a. Solve for the Keynesian equilibrium in the goods market.

$$Y = E$$
$$Y = 45 + 0.5(Y - 10 - 0.3Y) + 40 + 50$$
$$Y = 45 - 0.5 \cdot 10 + 90 + 0.5 \cdot (1 - 0.3)Y$$
$$Y^* = \frac{130}{1 - 0.35} = 200$$

b. If investment falls by 1 unit, find the resulting change in equilibrium output (no need to give exact answer, just write a formula and plug the numbers).

$$\Delta Y^* = \frac{-1}{1 - MPC(1-t)} = \frac{-1}{1 - 0.5(1-0.3)} = \frac{-1}{0.65} \approx -1.5$$

c. On a fully labeled graph illustrate the Keynesian equilibrium in the goods market before and after a fall in the proportional tax rate, assuming that the full employment remains above the new equilibrium. No numbers are required.



4. (15 points). The following table contains data from the labor market of some country (in millions).

Civilian noninstitutional population	100
Civilian labor force	**60**
Employed	54
Unemployed	**6**
Not in the labor force	40

a. Complete the above table.
b. Find the unemployment rate in this country.

$$\text{Unemp. Rate} = \frac{\#Unep}{\#Labor\ Force} = \frac{6}{60} = 0.1 = 10\%$$

c. Find the labor force participation rate in this country.

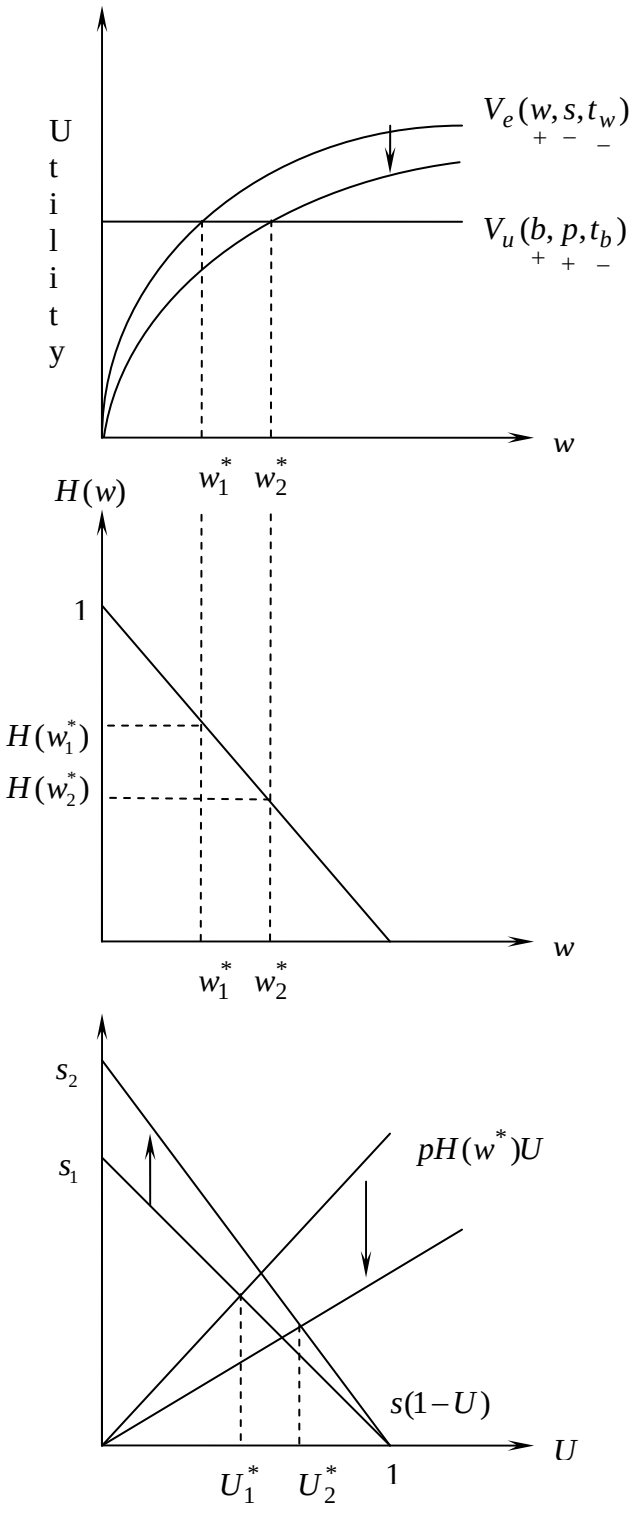
$$\text{Labor Force Participation rate} = \frac{\#Labor\ Force}{\#Civilian\ Noninst.Pop.} = \frac{60}{100} = 0.6 = 60\%$$

5. (15 points). Consider the search model of unemployment, briefly described as follows.

	Unemployed	**Employed**
Fraction in population	U	$1 - U$
Utility	$V_u(b, p, t_b)$ $+ \ + \ -$	$V_e(w, s, t_w)$ $+ \ - \ -$
	b – unemployment insurance benefit p – probability of receiving a job offer t_b – tax on b	w – real wage s – separation rate (probability of loosing the job) t_w – tax on w

The symbols "+" under variable of the utility function indicates the assumption that the utility is increasing in that variable, and "– " under a variable indicates that the utility is decreasing in that variable.
Distribution of wage offers: $H(w)$ gives the probability that an offer is at least w.

Illustrate with 3 fully labeled graphs the impact of an increase in separation rate ($s \uparrow$) on: (1) reservation wage w^*, (2) probability of acceptance of job offers $H(w^*)$, and (3) steady-state unemployment rate U^*.


Utility
$V_e(w, s, t_w)$
+ − −
$V_u(b, p, t_b)$
+ + −
w
w_1^* w_2^*
$H(w)$
1
$H(w_1^*)$
$H(w_2^*)$
w
w_1^* w_2^*
s_2
s_1
$pH(w^*)U$
$s(1-U)$
U
U_1^* U_2^* 1

6. (10 points). Suppose that in some economy the private saving is 100, the domestic investment is 80, and the government runs a deficit of 20. What must be the trade deficit in that country? Show your calculations.

$$\underbrace{S_P}_{100} + \underbrace{S_G}_{-20} = \underbrace{I}_{80} + \underbrace{NX}_{?}$$

$$NX = 0$$

Thus, the trade deficit is $-NX = 0$