Question #1
Consider the market for loanable funds in Odiland, with demand and supply given by:
D: i = 36 – (.2)I
S: i = (.05)I
where i is the interest rate (in percent) and I is the level of investment (in millions).

a) Find the market equilibrium interest rate and level of investment.

Setting our D and S equations equal to each other, we have
36 – (.2)I = (.05)I, so 36 = (.25)I, so I = 144, and i* = (.05)I* = .05 x 144 = 7.2.*

Now the Odiland government has decided to build a dam. Originally, the Odiland government budget was balanced, but this project will give the government a deficit of $20 million.

b) Give the equations for the new supply and demand curves after the government decides to build the dam.

Supply is unchanged, as the government is running a deficit. Demand shifts right by 20 units, so we have
D: i = 36 – (.2)(I – 20) = 36 – (.2)I + 4 = 40 – (.2)I
S: i = (.05)I

c) Solve for the new market equilibrium interest rate and total investment.

Following the same procedure as in a), we have
40 – (.2)I = (.05)I, so 40 = (.25)I, so I = 160, i* = (.05)I* = .05 x 160 = 8.*

d) How much private investment has been "crowded out" by the government deficit?

At an interest rate of 8%, private investment demand is
8 = 36 – (.2)I, so 28 = (.2)I, so I = 140.
Since private investment before the government deficit was 144, we see that $4 million worth of private investment has been crowded out by the deficit.

e) Assume that Odiland has a closed economy. How much does household consumption fall as a result of the government deficit if total output and net taxes remain the same?

With a closed economy, there are no imports or exports. Since savings = investment and household income must equal savings + consumption, we need only find the amount that household savings changed after the deficit. Since I = 144 before the dam and I* = 160 afterwards, household savings rose $16 million, so household consumption must fall $16 million.*

Alternatively, we may think of this as
Y = C + I + G = C1 + 144 + G1, where 1 denotes "before the dam", and

Y = C2 + 140 + G2, where 2 denotes "after the dam".
We know that Y is the same in the two scenarios, and G2 = G1 + 20, so
Y = C2 + 140 + G1 + 20 = C1 + G1 + 144, so C2 = C1 – 16.

Question #2
The country of Calvinia has an open economy. Last year in Calvinia, households spent $600 on goods, $300 on services, saved $100, and paid taxes of $400. Businesses spent $700 on new plants and equipment and $100 replacing worn out capital. The government ran a deficit of $200 and spent $100 on transfer programs. Calvinia exported $200 worth of goods and services.

a) Assume that the classical model accurately describes the economy of Calvinia. Rody, a noted macroeconomist, studies Calvinia and estimates imports at $1200. Is Rody correct? If so, prove it. If not, what is the correct value?

In order to get total spending = total output, we must have leakages = injections.
Leakages = Sp + T – TR + M = 100 + 400 – 100 + M = 400 + M
Government Spending is given by government deficit and net taxes, or G –(T-TR) = 200, which implies G = 200 + (T-TR) = 200 + (400 – 100) = 500
Injections = I + G + X = 700 + 500 + 200 = 1400
So 1400 = 400 + M, and M = 1000. So Calvinia imported $1000 worth of goods and services, and Rody is wrong.

b) Now that we have established the correct value for imports, find GDP in Calvinia.

Y = C + I + G + X – M = 900 + 700 + 500 + 200 – 1000 = $1300

The country of Hobistan has a closed economy. The government budget is balanced, and the government collects $800 in revenue every year. Hobistan's GDP is $2500, of which $1400 is household consumption. There are no government transfers.

c) Assume that the classical model accurately describes Hobistan. How much private savings is there in Hobistan?

In a closed economy, NS = I, so we only need to find I. Also, the government budget is balanced and there are no transfers, so G = 800. Thus we have
Y = C + I + G, so 2500 = 1400 + I + 800, so I = NS = $300.

Question #3
The labor market on Doons Island is defined by the equations
D: (w/p) = 45 – 3L
S: (w/p) = 2L,
where the real wage (w/p) is in dollars and L is the labor force (in millions).
The aggregate production function of Doons Island is given by
$\mathbf{Y = K^{.5}L^{.5}}$

where K is the capital stock (in millions of dollars), L is the labor force (in millions), and Y is real GDP (also in millions of dollars).

a) In 2005, there is $25 million worth of capital on Doons Island. What is its real GDP?

First, we solve for the equilibrium level of employment on Doons Island. Thus we have
45 – 3L = 2L, so 45 = 5L, so L = 9 million.
Using our aggregate production function, we have
$Y = (25)^{.5}(9)^{.5} = 5 \times 3 = 15$, so Y = $15 million.

b) What is the current level of labor productivity?

Labor productivity is the slope of the line which runs through both the origin and the current point on the aggregate production function. This line must have slope = 15/9 = 1.66.

c) The government of Doons Island decides to give businesses a tax credit for hiring workers. This causes the demand curve to shift to **D: (w/p) = 80 – 3L**, while the supply curve remains unaffected. This program costs the government $6 million per year. However, the Doons Island constitution also has a balanced budget amendment, so in order to implement the program, taxes must be raised by an equivalent amount. Assume that investment does not change when the program is in place. Does this tax credit program increase GDP? How about labor productivity?

The increased government spending is offset by a corresponding fall in consumption, so we need only worry about the change in GDP which occurs through the labor market and aggregate production function.

We solve for L as before:*
80 – 3L = 2L, so 5L = 80, so L = 16, and*
$Y = (25)^{.5}(16)^{.5} = 5 \times 4 = 20$, so Y = $20 million. GDP has increased by $5 million.

Labor productivity must fall, as the aggregate production function has not changed, but labor has increased. Specifically, we compute labor productivity as 20/16 = 1.25.

d) In 2006 Investment is $11 million higher than total depreciation costs on Doons Island in 2005. Assuming that the tax credit is still in place, what will be the value of GDP in 2006? What about labor productivity?

Since investment is $11 million greater than depreciation, the capital stock increases from $25 million to $36 million. With 16 million workers, we have
$Y = (36)^{.5}(16)^{.5} = 6 \times 4 = 24$, so Y = $24 million.
Similarly, labor productivity = 24/16 = 1.5.