1. [10%] Show that the Engel curve is a straight line if the utility function is given by \( U = q_1^\gamma q_2 \), where \( \gamma > 0 \).

2. [10%] An entrepreneur's short-run total cost function is \( C = q^3 - 10q^2 + 17q + 66 \).
   (a) Determine the output level at which he maximize profit if \( p=5 \).
   (b) Compute the output elasticity of cost at this output.

3. [15%] Assume your utility function is \( U = -W^{-1} \). If you are exposed to a 50/50 chance of gaining or losing $1,000 and insurance that removes the risk costs $500, at what level of wealth will you be indifferent relative to taking the gamble or paying the insurance?

4. [15%] Consider a bond market with 150 consumers. Assume that all consumers have the same two-period consumption-utility function of \( U = c_1c_2 \). Let each of 100 consumers have the income stream \( y_1 = 10,000, y_2 = 8,400 \), and each of the remaining 50 consumers have the income stream \( y_1 = 8,000, y_2 = 14,000 \). Find the interest rate that makes the bond market in equilibrium.

5. [15%] Find all the Nash equilibriums of the following game. Player 1 plays actions A, B and C with the left-side payoffs; on the other hand, player 2 chooses strategies L, M and R with the right-side payoffs.

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>M</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0,1</td>
<td>0,0</td>
<td>10,0</td>
</tr>
<tr>
<td>B</td>
<td>2,1</td>
<td>1,2</td>
<td>0,1</td>
</tr>
<tr>
<td>C</td>
<td>1,2</td>
<td>2,1</td>
<td>0,1</td>
</tr>
</tbody>
</table>
6. [20%] Suppose consumption and investment are described by the following:

\[ C = 150 + 0.75DI \]
\[ I = 300 + 0.2Y - 50r \]

Here \( DI \) is disposable income, \( Y \) is GDP, and \( r \), the interest rate is measured in percentage points. (For example, a 5 percent interest rate is \( r = 5 \).) Exports and imports are as follows:

\[ X = 300 \]
\[ IM = 250 + 0.2Y \]

Government purchases are \( G = 800 \), and taxes are 20 percent of income. The price level is fixed and central bank uses its monetary policy to peg the interest rate at \( r = 8 \).

(a) Find the equilibrium GDP, the budget deficit or surplus, and the trade deficit or surplus. (10%)

(b) Suppose the currency appreciates and, as a result, exports and imports change to

\[ X = 250 \]
\[ IM = 0.2Y \]

Now find the new equilibrium GDP, the budget deficit or surplus, and the trade deficit or surplus. (10%)

7. [15%] Multiple Choice

(1) If a country tries to stimulate the economy with fiscal policy, the effects will be exchange rate

a. depreciation, lower interest rates, and a small increase in aggregate demand.
b. depreciation, higher interest rates, and a small decrease in aggregate demand.
c. appreciation, lower interest rates, and a small increase in aggregate demand.
d. appreciation, higher interest rates, and a small increase in aggregate demand.

(2) Are funds available on a credit card included in a definition of the money supply?

a. Yes, because these funds can be used to pay for goods and services.
b. Yes, because these funds are included in \( M_2 \).
c. No, because these funds are hard to measure total credit card spending.
d. No, because these funds are not a store of value.
(3) What are the results of a contractionary monetary policy in an open economy with floating exchange rates and internationally mobile capital?

a. The dollar appreciates, which leads to an increase in exports and a decrease in imports. The country therefore winds up with a deficit in capital and a surplus in its balance of trade.

b. The dollar appreciates, which attracts foreign capital. Also, imports rise and exports decline. The country therefore winds up with a surplus in capital and an increase in its trade deficit.

c. The dollar depreciates, which attracts foreign capital. Also, exports rise and imports decline. The country therefore winds up with a deficit in capital and a surplus in its balance of trade.

d. The dollar depreciates, which leads to a larger real GDP and a larger trade surplus.

\[
\begin{array}{|c|c|c|}
\hline
\text{Output Per Unit Labor Input} & \text{England} & \text{Portugal} \\
\hline
\text{Cloth} & 20 & 24 \\
\text{Wine} & 2 & 12 \\
\hline
\end{array}
\]

Using the data from the above Table, suppose England transfers 2 units of labor from wine to cloth and Portugal transfers 1 unit from cloth to wine. The combined production of wine and cloth will be increased by

a. 16 wine, 8 cloth.
b. 16 wine, 16 cloth.
c. 12 wine, 12 cloth.
d. 8 wine, 16 cloth.

(5) If fluctuations in economic activity come from the supply side, higher inflation is associated with

a. lower interest rates.
b. structural deficits.
c. higher rates of unemployment.
d. lower rates of unemployment.