1. **Hands dirty with data (8 points):**

   (a) Data downloaded ok and graphs look ok (mean is zero because took out trend, quarterly frequency, etc.)

   (b) Chart with real GDP and employment: should look like Figure 1

   ![GDP and Employment](image1.png)

   **Figure 1:** GDP and Employment

   - Correlation between output and employment = 0.81
   - Explain this because more employment means more output and more demand for production means more employed so these two series are very likely to move together.

   (c) Chart with CPI and M1: should look like Figure 2

   ![CPI and M1](image2.png)

   **Figure 2:** The CPI and M1- Monthly Data

   - Correlation between the two series = -0.06
Figure 3: The CPI and M1-10 Year Moving Averages

(d) Chart with CPI and M1 over ten year periods: should look like Figure 3

- Correlation between the two series = 0.64
- The quantity theory of money is a long run theory- increases in the money supply translate to higher inflation rates over the longer term. In the short term, prices may not have time to adjust and so the correlation is not as strong.

2. Chapter 2, “Problems and Applications”, #6 (2 points):

(a) See Table 1

Table 1: Chapter 2, “Problems and Applications”, #6a

<table>
<thead>
<tr>
<th>Variable</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal GDP</td>
<td>$10 million</td>
<td>$15.2 million</td>
</tr>
<tr>
<td>Real GDP</td>
<td>$10 million</td>
<td>$10 million</td>
</tr>
<tr>
<td>GDP Deflator</td>
<td>100 (or 1)</td>
<td>152 (or 1.52)</td>
</tr>
<tr>
<td>CPI</td>
<td>100 (or 1)</td>
<td>160 (or 1.60)</td>
</tr>
</tbody>
</table>

(b) Inflation by the Laspeyres Index (CPI) = 60%. By the Paasche Index (GDP Deflator) = 52%. The difference is the fixed basket versus changing weight basket. The fixed basket doesn’t account for the fact that people substituted towards the relatively cheaper cars in 2001 and so overestimates the rate of inflation.

(c) I’d use the GDP deflator, because it pays out less since there isn’t the upward bias in prices because of substitution and other issues with the CPI. Of course it depends upon what objective the politician has- should he minimize pay outs to keep the budget under control or should he maximize them to increase he chances of reelection.

3. Chapter 2 related employment question (2 points):

(a) percent of workforce not in the labor force = 26.3% (depending about what was assumed regarding the employment status of the disabled and retired, a number between 10.5% and 26.3% will work).

(b) labor force participation rate = 73.7% (again, depending on assumptions this may be between 73.7% and 89.5%).
(c) unemployment rate = 7.14% (as above, depending on assumptions, between 5.9% and 17.6%)

4. Chapter 3, “Problems and Applications” (8 points): #4, #10, #11

• #4
  (a) Capital receives 30% of income, labor receives 70%
  (b) Output (Y) increases 7%, the real rental rate = \( \frac{R}{P} \) = MPK increases 7%, the real wage = \( \frac{W}{P} \) = MPL decreases by 3%
  (c) Output (Y) increases 3%, the real rental rate = \( \frac{R}{P} \) = MPK decreases by 7%, the real wage = \( \frac{W}{P} \) = MPL increases 3%
  (d) Output (Y) increases 10%, the real rental rate = \( \frac{R}{P} \) = MPK increases 10%, the real wage = \( \frac{W}{P} \) = MPL increases 10%

• #10
  (a) Private Savings = $750, Public Savings = $0, National Savings = $750
  (b) \( r = 5\% \)
  (c) Private Savings = $750, Public Savings = $-250, National Savings = $500
  (d) \( r = 10\% \)

• #11
  – Nothing happens to public savings. If the marginal propensity to consume is 1, then nothing happens to private savings either and thus there is no effect on the real interest rate or investment. However, if the marginal propensity to consume is less than 1, then the fall in consumption would be all large as the increase in net taxes and thus private savings will fall. This means the real interest rate will rise and investment will fall (i.e. there will be crowding out of investment).

5. Chapter 4, “Problems and Applications” (8 points): #2, #3, #5

• #2
  (a) Bond purchases put more currency in circulation, increasing \( B \) and \( M \). The money multipliers is not directly affected.
  (b) Increases in the interest paid on reserves encourages banks to hold more reserves, increasing the reserve-deposit ratio, which lowers the money multiplier and thus, \( M \), the money supply. The monetary base is not directly affected.
  (c) The reduction in lending from the Fed decreases the borrowing of banks, thus lowering the amount of reserves and the monetary base, \( B \), and the money supply, \( M \). The money multiplier is not directly affected.
  (d) This increases the currency deposit rate, thus lowering the money multiplier as people withdraw funds from bank accounts. The lowers the money supply, but has no direct affect on the monetary base.
  (e) The helicopter drop increases the amount of currency in circulation, increasing \( B \) and \( M \). There is not direct effect on the money multiplier.

• #3
  (a) \( M = $1,000 \)
(b) \( M = \$1,000 \)
(c) \( M = \$5,000 \)
(d) \( M = \$1,666.67 \) (currency-deposit ratio = 1, reserve-deposit ratio = 0.2 \( \Rightarrow m = 1.67 \))
(e) The money supply is proportional to the monetary base and is given by \( M = m \times B \). Since \( m \) is a constant number defined by the currency-deposit ratio and the reserve-deposit ratio, a 10-percent increase in the monetary base \( B \) will lead to a 10-percent increase in the money supply \( M \) in all cases.

• #5
  (a) The tax made it more costly to write checks, so use less checks and more currency in transactions. Thus increases currency holdings, increasing the currency-deposit ratio.
  (b) Increases in the currency-deposit ratio decrease the money multiplier and thus the money supply.
  (c) No, it was a bad idea. It exacerbated the problem of the collapsing money supply during that time.