1. Suppose that the spot price of EUR is 0.9750 USD for 1 Euro on September 10, 2002. 3 Month forward rate is 0.9730 USD for 1 Euro. Suppose that the 3 Month USD interest rate is 1.80% and Euro interest rate is 3.30% (rates are annualized and compounded daily). Is there an arbitrage opportunity?

2. What is the difference between a forward contract and a futures contract?

3. Go to http://www.yahoo.com then Finance/Quotes, chose Chart and type MSFT in the box. Click Historical Quotes below the chart. Input dates September 1, 2002, October 1, 2001. Click Download Spreadsheet Format in the bottom of the page. Data is in the format Date, Open, High, Low, Close, Volume in Excel. Make and submit the printouts of 2 plots: Cumulative Distribution Functions of returns and approximate Probability Density Function of returns using 0.2% horizontal intervals. Calculate mean, variance, standard deviation, mean absolute deviation, kurtosis and skewness of daily returns in Excel.

4. You want to buy a futures contract. How much will it cost you? What is the difference between an initial margin and a maintenance margin? What is a margin call?

5. What is the difference between taking a long futures position in SP500 futures and buying SP500 stock index shares SPY?

6. What is the six-month forward price for a stock providing no income if the stock price is 50 and the interest rate is 2%? What is the forward price if the stock pays a 3% dividend yield (for simplicity use continuous compounding)? What is the forward price if the stock pays dividends with a present value of 1?

7. Compute the variances of two random variables whose probability tables are given:

<table>
<thead>
<tr>
<th>Value of $X_1$</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>0.3</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Value of $X_2$</td>
<td>0</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>Probability</td>
<td>0.5</td>
<td>0.1</td>
<td>0.2</td>
</tr>
</tbody>
</table>

8. An experiment consists of selecting 2 numbers at random from the set of integers \{1, 2, 3, 4\} and then calculating their sum $S$. The numbers can repeat. Find mean $E(S)$, $Var(S)$, and $\sigma(S)$.

9. Let $X$ be a continuous random variable between -1 and 1 with probability density function $p(x) = \frac{3}{2}x^2$. Calculate $Prob(-\frac{1}{2} < x < \frac{1}{2})$. Find $E(X)$ and $Var(X)$.

10. Suppose that $X$ and $Y$ are 2 independent normally distributed random variables. $X$ has mean $\mu = 2$ and standard deviation $\sigma = 3$. $Y$ has mean $\mu = 1$ and standard deviation $\sigma = 4$. What can you say about the distribution of $X + Y$? Explain your answer.

11. Go to Bloomberg and type FV Go. It will give you a Fair Value table for futures on major indices: Spot index price, theoretical no arbitrage futures price for a given spot index price and finally an actual futures price. How would you arbitrage if there is a discrepancy between theoretical and actual price of SP future say SPZ2 Index. Submit the printouts.

12. Let $X$ be a continuous Uniform random variable between -3 and 3. Calculate $Prob(-\frac{1}{2} < x < \frac{1}{2})$. Find $E(X)$ and $Var(X)$. 