Midterm exam

Please answer all questions. The weight of each question is given next to the question number.

1. (30%) Explain the reasons why you agree or disagree with the following statements. Circle the correct answer and complete the sentence.

i. If professors allowed students to insure themselves against poor performance in midterm exams at UCSD, this would lead to an overall better exam performance.

   Agree / Disagree because

ii. The graph relating the futures prices of a stock index to the time to expiration must always slope upwards.

   Agree / Disagree because
iii. If reverse cash and carry is not possible, then the futures price of a consumption commodity, $F$, must satisfy the relation

$$F > S_0 \exp((u + r)T),$$

where $S_0$ is the current spot price of the commodity, $u$ is the storage cost, $r$ is the risk-free rate and $T$ is the time to expiration.

Agree / disagree, because

iv. A financial hedge is not guaranteed to benefit the hedger financially. Its main purpose is to offset an existing exposure to risk.

Agree / disagree, because
2. (25%) A company needs to buy 1 million gallons of heating oil in May 2001. The current futures price for this expiration date is $0.8190 per gallon, while the current spot price is $0.9602. Each futures contract is for 42,000 gallons of oil.

i. Suppose that the correlation between changes in futures and spot prices is 0.98. How many futures contracts should the company trade to set up a hedge? Should it use a long or a short hedge?

ii. Now suppose that, in fact, in May 2001 the spot price of heating oil is $0.7800 per gallon. How much did the company profit/lose on its futures position?

iii. If the cost of carry is 1% for oil and the current interest rate is 6% per annum, what is the convenience yield on oil between now and May 2001? What does it measure?
3. (25%) On October 17, 2000 the $ per yen exchange rate in the spot and forward markets were as follows:

<table>
<thead>
<tr>
<th></th>
<th>Spot</th>
<th>Sept 01</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>0.009358</td>
<td>0.009784</td>
</tr>
</tbody>
</table>

Each forward contract is for 12.5 million yen.

i. Which was highest on this date, the U.S. or the Japanese interest rate?

ii. Assuming that the U.S. interest rate is 6% per annum for a loan expiring in September 01, what would be the Japanese interest rate for this period?

iii. Now suppose that the U.S. and Japanese interest rates are in fact identical (for loans expiring in September 01). How would you set up an investment strategy that is guaranteed to earn an arbitrage profit?
4. (20%) An investor sets up a short position in gold futures on September 19, 2000 when the price is $280 per ounce. Each contract covers 100 ounces of gold. The initial margin is $1400 and the maintenance margin is $1,050.

Fill out the margin account, funds withdrawn and margin call for the following 5 days:

<table>
<thead>
<tr>
<th>Date</th>
<th>Gold Price</th>
<th>Margin account</th>
<th>Funds withdrawn</th>
<th>Margin calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/20</td>
<td>280</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/21</td>
<td>279</td>
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<td></td>
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<tr>
<td>9/25</td>
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<tr>
<td>9/26</td>
<td>288</td>
<td></td>
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