Problem Set 4: CAPM.
Due: Class 13 Tuesday 8th March 2005

I. SML and the CAPM:
   A. In a CAPM world, what is the beta (with respect to the market portfolio M) of a
      portfolio with E[R_p]=20%, if R_f=5% and E[R_M]=15%?
   B. In 1994, the rate of return on short-term government securities (perceived to be
      riskfree) was about 4%. Suppose the expected rate of return required by the
      market for a portfolio with a beta measure of 1 is 12%. According to the CAPM
      (SML):
         1. What is the expected rate of return on the market portfolio?
         2. What would be the expected rate of return on stock with a beta of 0?
         3. Suppose you consider buying a share of stock at $40. The stock is
            expected to pay $3 dividends next year and you expect it to sell then for
            $41. The stock’s systematic risk has been evaluated to be β=-0.5. Is the
            stock over or under priced?

II. SML vs CML in the CAPM: Assume that the CAPM holds in the economy. The
    following data is available about the market portfolio, the riskless rate and two assets, A
    and B. Remember β_{i,m} = σ[R_i, R_m]/(σ[R_m]^2).

<table>
<thead>
<tr>
<th>Asset i</th>
<th>E[R_i]</th>
<th>σ[R_i]</th>
<th>β_{i,m}</th>
</tr>
</thead>
<tbody>
<tr>
<td>m (market)</td>
<td>0.15</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>0.096</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0.07</td>
<td>0.6</td>
<td></td>
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</tbody>
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R_f = 0.10.

A. What is β_{i,m} for i equal to the market portfolio (i.e., β_{m,m})?
B. What is the expected return on asset A (i.e., E[R_A])?
C. What is the expected return on asset B (i.e., E[R_B])?
D. Does asset A plot:
   1. on the SML (security market line)?
   2. on the CML (capital market line)?
E. Does asset B plot:
   1. on the SML?
   2. on the CML?
F. Could any investor hold asset A as her entire portfolio?
G. Could any investor hold asset B as her entire portfolio?
H. What is the correlation of asset A with the market portfolio?
I. What is the correlation of asset B with the market portfolio?
J. Can anything be said about the composition of asset A (i.e., what assets make up
asset A)?
K. Can anything be said about the composition of asset B?