Problem Set 4: CAPM.

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 $\text{E}[R_p]=20\%$, if $R_f=5\%$ and $\text{E}[R_M]=15\%$?

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 $\beta=-0.5$. 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 $\beta_{i,m} = \frac{\sigma[R_i, R_m]}{\sigma[R_m]^2}$.

<table>
<thead>
<tr>
<th>Asset i</th>
<th>$\text{E}[R_i]$</th>
<th>$\sigma[R_i]$</th>
<th>$\beta_{i,m}$</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>
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$R_f = 0.10$.

A. What is $\beta_{i,m}$ for $i$ equal to the market portfolio (i.e., $\beta_{m,m}$)?
B. What is the expected return on asset A (i.e., $\text{E}[R_A]$)?
C. What is the expected return on asset B (i.e., $\text{E}[R_B]$)?
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?