Key to 4:00 Quiz: 2/20/12

and Johnson & Johnson (JNJ), the covariance between the returns on these two stocks, and the standard deviation of returns you can expect if you invest $100,000 in Johnson & Johnson and $400,000 in Exxon Mobil. (Assume that these past returns are representative for both firms).

<table>
<thead>
<tr>
<th>Year</th>
<th>XOM</th>
<th>JNJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>+6%</td>
<td>+14%</td>
</tr>
<tr>
<td>2010</td>
<td>+29%</td>
<td>-2%</td>
</tr>
<tr>
<td>2009</td>
<td>-14%</td>
<td>+13%</td>
</tr>
<tr>
<td>2008</td>
<td>-9%</td>
<td>-6%</td>
</tr>
</tbody>
</table>

Note: You don't have to solve anything, just set everything up.

\[
SD(R_{XOM}) = \sqrt{Var(R_{XOM})}
\]

\[
Var(R_{XOM}) = \frac{1}{3}((6 - \bar{R}_{XOM})^2 + (29 - \bar{R}_{XOM})^2 + (-14 - \bar{R}_{XOM})^2 + (-9 - \bar{R}_{XOM})^2)
\]

\[
\bar{R}_{XOM} = \frac{1}{4}(6 + 29 - 14 - 9)
\]

\[
SD(R_{JNJ}) = \sqrt{Var(R_{JNJ})}
\]

\[
Var(R_{JNJ}) = \frac{1}{3}((14 - \bar{R}_{JNJ})^2 + (2 - \bar{R}_{JNJ})^2 + (13 - \bar{R}_{JNJ})^2 + (-6 - \bar{R}_{JNJ})^2)
\]

\[
\bar{R}_{JNJ} = \frac{1}{4}(14 - 2 + 13 - 6)
\]

\[
Cov(R_{XOM}, R_{JNJ}) = \frac{1}{3}((6 - R_{XOM})(14 - R_{JNJ}) + (29 - R_{XOM})(-2 - R_{JNJ}) + (-14 - R_{XOM})(13 - R_{JNJ}) + (-9 - R_{XOM})(-6 - R_{JNJ}))
\]

\[
Var(R_p) = \left(\frac{100,000}{500,000}\right)^2 Var(R_{XOM}) + \left(\frac{400,000}{500,000}\right)^2 Var(R_{JNJ}) + 2 \left(\frac{400,000}{500,000}\right) \left(\frac{400,000}{500,000}\right) Cov(R_{XOM}, R_{JNJ})
\]

\[
SD(R_p) = \sqrt{Var(R_p)}
\]