1a)

The expected return of the market portfolio is 10 %.

Calculations:

1 a) $E(R_1)=6\%$ $X_1=0{,}25$

$E(R_2)=10\%$ $X_2=0{,}25$

$E(R_3)=12\%$ $X_3=0{,}5$

I assume that $X_1=0{,}25$ since adding the shares should sum up to 1 ($1-0{,}5-0{,}25=0{,}25$).

$$E(R_M)=X_1\cdot E(R_1)+X_2\cdot E(R_2)+X_3\cdot E(R_3)$$

$$E(R_M)=0{,}25\cdot 6+0{,}25\cdot 10+0{,}5\cdot 12=10\%$$

Expected return on the market portfolio is 10%.

1b)

The equation of the SML is $E(R_i)=2+8*\beta_i$

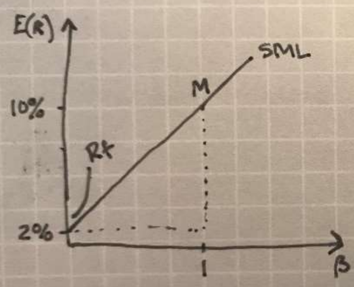
$\beta_1=0{,}5$

$\beta_2=1$

$\beta_3=1{,}25$

Calculations:

1 b) Since market always have $\beta_M=1$, and the risk free asset always have $\beta_{Rf}=0$ we get



slope: $\frac{10-2}{1-0}=8$

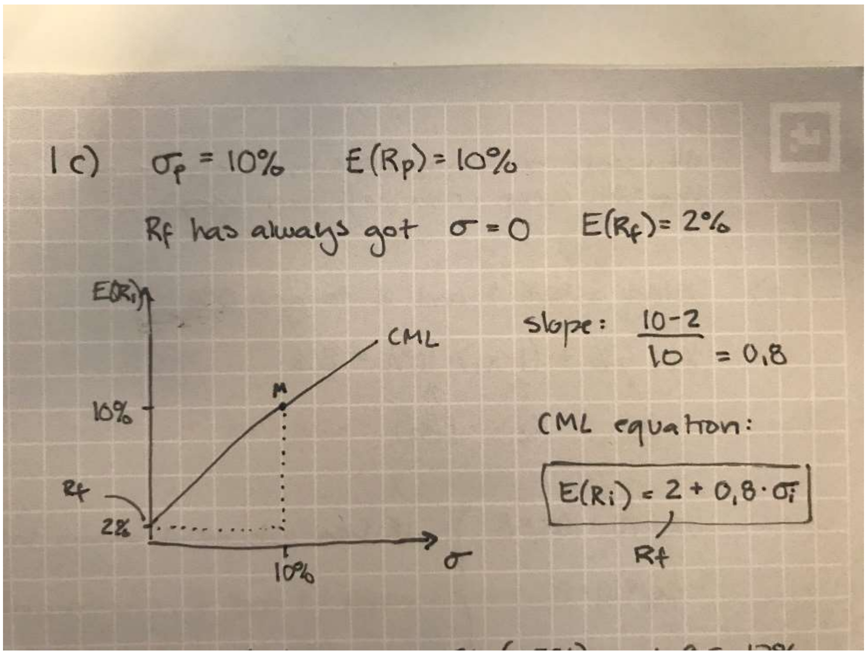
SML equation:

$\boxed{E(R_i)=\underbrace{2}_{R_f}+8\cdot\beta}$

1c)

The equation of the CML is $E(R_i) = 2 + 0{,}8 * \sigma_i$

Calculations:



1d)

It is an efficient portfolio. Holding $0{,}5 * 10\%$ $(= 5\%)$, and $0{,}5 * 12\%$ $(= 6\%)$ gives him a return of $5\% + 6\% = 11\%$ with a standard deviation of $\sigma = 11{,}25\%$ $(\mathit{from}\ 11 = 2 + 0{,}8 * \sigma)$, which is the same as $0{,}5 * 10 + 0{,}5 * 12{,}5 = 11{,}25\%$ (where 10 comes from asset 2: $10 = 2 + 0{,}8\ \sigma$, and 12,5 comes from asset 3: $12 = 2 + 0{,}8\ \sigma$). The portfolio is on the capital market line, CML, and is therefore efficient.

1e)

Yes, it will lie on the SML. If CAPM holds (as given in the question), all assets and combinations of assets lie on the SML curve. Had the answer to question 1d) been no, it is not efficient, the portfolio would still lie on the SML, since even inefficient portfolios and assets does.

1f)

Maximize Sharpe´s ratio, i.e. the slope of CAL, by combining the risk-free asset ($R_F = 2\%$), and the tangent portfolio ($E(R_p) = 10\%$). I find that the optimal shares are 0,25 in the risk-free asset, and 0,75 in the tangent portfolio. Using the weights for each asset from the question, the new shares of the assets are:

$x_1 = 0{,}1825$ $x_2 = 0{,}1825$ $x_3 = 0{,}375$ $x_{R_F} = 0{,}25$ $\Sigma x_i = 1$

Calculations:

$$X_p \cdot 10\% + (1-X_p) \cdot 2\% = 8\%$$
$$10X_p + 2 - 2X_p = 8$$
$$8x_p = 6$$
$$x_p = 0{,}75$$
$$1 - X_p = 0{,}25$$

$$X_1 \rightarrow 0{,}75 \cdot 0{,}25 = 0{,}1825$$
$$X_2 \Rightarrow \quad -\!\!-\,11\,-\!\!- \quad = 0{,}1825$$
$$X_3 \Rightarrow 0{,}75 \cdot 0{,}5 = 0{,}375$$
$$X_{rf} = 0{,}25$$
$$\Sigma X =$$

1g)

$\sigma_P = 7{,}5\ \%$ $\beta_P = 0{,}75$

Calculations:

1g) σ: $8 = 2 + 0{,}8\sigma_P$ β: $8 = 2 + 8 \cdot \beta_P$

$6 = 0{,}8\sigma_P$ $6 = 8\beta_P$

$\boxed{\sigma_P = 7{,}5\%}$ $\boxed{\beta_P = 0{,}75}$

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2p

2a)

$r = 3{,}5\%$ for the risk-free government bond.

Price, SCA: 96,1538

Price, Volvo: 95,3289

Price, StoraEnso: 94,3396

Price, ComHem: 90,9091

Calculations:

2a) $P \cdot (1+r) = FV$

$P = 96{,}618$

$FV = 100$

$\rightarrow 96{,}618 \cdot (1+r) = 100$

$r = 0{,}0350$

$r = 3{,}5\%$

$\text{Price} = PV \cdot \frac{1}{1+r}$

SCA: $100 \cdot \frac{1}{1+0{,}04} = 96{,}1538$

Volvo: $100 \cdot \frac{1}{1+0{,}049} = 95{,}3289$

SE: $100 \cdot \frac{1}{1+0{,}06} = 94{,}3396$

ComHem: $100 \cdot \frac{1}{1+0{,}1} = 90{,}9091$

2b)

$$E(R_{SCA}) = \frac{100}{96{,}1538} = 1{,}0400\%$$

$$P_{SCA} = 1 - \left(\frac{1{,}035}{1{,}040}\right) = 0{,}0048 = 0{,}48\%$$

$$E(R_{Volvo}) = \frac{100}{95{,}3289} = 1{,}0490\%$$

$$P_{Volvo} = 1 - \left(\frac{1{,}035}{1{,}049}\right) = 0{,}0133 = 1{,}33\%$$

$$E(R_{StoraEnso}) = \frac{100}{94{,}3396} = 1{,}0600\%$$

$$P_{StoraEnso} = 1 - \left(\frac{1{,}035}{1{,}060}\right) = 0{,}0236 = 2{,}36\%$$

$$E(R_{ComHem}) = \frac{100}{90{,}9091} = 1{,}1000\%$$

$$P_{ComHem} = 1 - \left(\frac{1{,}035}{1{,}10}\right) = 0{,}0591 = 5{,}91\%$$

2c)

10,2142%.

Calculation:

2c) $\beta = \frac{\sigma_{volvo,m}}{\sigma_m^2} = 1{,}2857$

$\left.\begin{array}{l} \beta_{Rf} = 0 \\ \beta_{RM} = 1 \end{array}\right\}$ SML slope $\frac{8{,}5-2{,}5}{1-0} = 6$

SML: $2.5 + 6 \cdot \beta$

$E(R_v) = 2{,}5 + 6 \cdot 1{,}2857 = 10{,}2142\%$

2d)

Volvo´s realized yearly rate of return is 7,177%:

$100 * (1-r)^{10} = 200$

$(1-r)^{10} = 2$

$1 - r = 2^{\frac{1}{10}}$

$r = 7{,}177\%$

1,5p

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4a)

Null hypotheses tested are whether $\gamma_0 = 0$, and if γ_1 is equal to the market risk premium.

4b)

Null hypotheses tested are whether $\gamma_0 = 0$, if γ_1 is equal to the market risk premium and if $\gamma_2 = 0$.

4cd)

None of the null hypotheses were rejected.

Calculation:

Model 1

4c) γ_0: $0{,}0059/0{,}0034 = 1{,}73$ $1{,}73 < 1{,}96$ H_0 not rejected

γ_1: $(0{,}0078 - 0{,}0126)/0{,}0031 = -1{,}54$ $|-1{,}54| < 1{,}96$ —||—

Model 2

γ_0: $0{,}0053/0{,}0039 = 1{,}35$ $1{,}35 < 1{,}96$ H_0 not rejected

γ_1: $(0{,}0076 - 0{,}0126)/0{,}0032 = -1{,}56$ $|-1{,}56| < 1{,}96$ —||—

γ_2: $0{,}1988/0{,}5427 = 0{,}366$ $0{,}366 < 1{,}96$ H_0 not rejected