**Answers Exam Finance dd 18 December 2019 (preliminary)**

**MULTIPLE CHOICE QUESTIONS (72 points)**

Number of points mc questions = (number of correctly answered questions – 4) × 6

1./7. Answer: c.
At t = 0 Verbruggen borrows €0,50 / 0,02 = €25.

At t = 0 the investment in real projects is:
$CF_0$ + amount borrowed – $C_0$ = €61,20 + €25,00 - €65,00 = €21,20

The NPV is: - €21,20 + €81,60 / 1,02 = - €21,20 + €80,00 = €58,80.

2./8. Answer: d
OG = $CF_0 + CF_1 / (1+r) + NCW = C_0 + C_1/ (1+r)$
OG = 250 + 224,40 / (1,02) + 300 = 770
OG = 770 = $C_0 + C_1 / (1+r)$ >> $C_1$ = (770 - 380) ×1,02 = 397,80

3./9. Answer: d.
If value creation is the selection criterion, entrepreneur X will invest in the project with the highest NPV, even if that project does not have the highest PI.

Note:
Present value of the expected CFs starting at t =1 of A is: NPV + I = 78,4 + 100 = 178,4.
PI of A then is: 178,4 / 100 = 1,8
Present value of the expected CFs starting at t =1 of B is: NPV + I = 49,2 + 120 = 169,2
PI of B then is: 169,2 / 120 = 1,4
Present value of the expected CFs starting at t =1 of C is: NPV + I = 98,5 + 150 = 248,50
PI of C then is: 248,5 / 150 = 1,7

4./10. Answer: a
Required return is: $R_F + \beta \times$ market risk premium = 2% + 1,2 × 5% = 8,00%
NPV = -300 + 20 / 1,08 + [(26 / (0,08 – 0,03)) / 1,08] = 200

5./11. Answer: b
NPV = - investment-outlay + present value of the expected CFs after tax
The expected CF after tax year *t* = (expected CF before tax year *t* – depreciation year *t*) × (1-$\tau_c$) + deprecation year *t*.
NPV = - 90 + ((30-30) × 0,75 + 30) / 1,1 + ((90-30) × 0,75 + 30) / $1,1^2$ + ((120-30) × 0,75 + 30) / $1,1^3$ = 72,5

6./12. Answer: c
Given the cash flow pattern and the same discount rate, the NPV of A cannot be lower than that of B. The fact that the cash flow of A is received at t = 1 and that of B at t = 3 implies that the IRR of A is greater than that of B.

Calculation NPV:
NPV A = -100 + 400 /1,1 = 263,6
Calculation IRR:
NPV A = -100 + 400 / (1+IRR) = 0 >> IRR = 300%

Calculation NPV:
NPV B = $-100 + 400 / 1{,}1^3 = 200{,}5$
Calculation IRR:
NPV B = $-100 + 400 / (1+IRR)^3 = 0$ >> IRR = 58,7%

7./13. Answer: b
$P_A$ = $1.000 = 1.020/(1+r_1) \rightarrow r_1 = 2{,}00\%$
$P_B$ = $1.000 = 20 / (1+r_1) + 1.020/(1+r^2)^2 \rightarrow r_2 = 2{,}00\%$

$P_C$ = $40/(1+r_1) + 40 / (1+r_2)^2 + 1.040 / (1+r_2)^2(1+{}_2f_3)$
= $40/1{,}02 + 40/1{,}02^2 + 1.040 / (1{,}02)^2(1{,}025) = 1.052{,}90$

Or

$P_C$ = $40/(1+yield) + 40 / (1+yield)^2 + 1.040 / (1+yield)^3$
= $40/(1{,}0216) + 40 / (1{,}0216)^2 + 1.040 / (1{,}0216)^3 = 1.052{,}90$

8./14. Answer: b
P = (5% × 500 + 95% × 1.070) / (1,05) = 991,9048
P = promised CF / (1+yield) >> yield = 1.070 / 991,9048 – 1 = 7,87%

9./15. Answer: b
For A the following applies:
$P_0 = div_1 / (r-g)$
$200 = div_1 / (0{,}1-0{,}02) \rightarrow div_1 = (0{,}1-0{,}02) \times 200 = 16$
Pay-out ratio then is 16/20 = 80%

For A the following applies $P_0 = div_1 / (r-g)$
$100 = div_1 / (0{,}1-0{,}04) \rightarrow div_1 = (0{,}1-0{,}04) \times 100 = 6$
Pay-out ratio then is 6/20 = 30%

10./16. Answer: c
$P_3$ can be formed by going short in F and going long in $P_2$ ($P_2$ again consists of a long position in both A and B).

11./1. Answer: b
$E(R) = x_A \times E(R_A) + x_B \times E(R_B)$
$E(R) = 15\% = x_A \times 10\% + (1-x_A) \times 20\% \rightarrow x_A = 50\%$

If $\rho = 1$ then the following applies:
$\sigma(R) = x_A \times \sigma(R_A) + x_B \times \sigma(R_A) = 0{,}5 \times 20\% + 0{,}5 \times 50\% = 35\%$

12./2. Answer: d

a. True. The total risk of Q is the same as that of M, but since Q is inefficient, this implies that part of the risk of Q consists of unique risk. The systematic risk of Q is therefore smaller than that of M.
b. True. A portfolio consisting of a 50% long position in M and a 50% long position in F is efficient and therefore has no unique risk. Since Q is inefficient, Q does have a unique risk.
c. True. The beta is greater than 1.
d. False. The beta of Q is smaller than the beta of M.

13./3. Answer: d

The systematic risk expressed in the standard deviation of the return is:
$\rho \times \sigma_{R\ SMASH} = 0{,}45 \times 35\% = 15{,}75\%$
The unique risk of SMASH is: total risk - unique risk = 35,00% – 15,75% = 19,25%

14./4. Answer: b

The expected return of the market portfolio is:
$0{,}8 \cdot 6\% + 0{,}2 \cdot 16\% = 8\%$
The investor holds an efficient portfolio (unique risk is zero). According to the CML:
$5{,}6\% = X_F \cdot 2\% + (1 - X_F) \cdot 8\% \rightarrow X_F = 0{,}4$ en $X_M = 0{,}6$.

The level of risk of market portfolio M is:
$(\sigma_m)^2 = (x_A\ \sigma_A)^2 + (x_B\ \sigma_B)^2 + 2\ x_A\ x_B\ cov(R_A, R_B) = (0{,}8 \cdot 0{,}30)^2 + (0{,}2 \cdot 0{,}40)^2 + 0 = 0{,}064 \rightarrow \sigma_m = 0{,}2529822$

The risk of OPT is: $X_M \times \sigma_m = 0{,}6 \times 0{,}2529822 = 0{,}1518$

15./5. Answer: a.

CEQ CF = $(7.500/1{,}08^3) \times 1{,}02^3 = 6.318$

16./6. Answer: b

a. False. If investor AUREUS - by using its developed method - is able to systematically achieve abnormal returns then this indicates a market that is not efficient in the semi-strong form and possibly also not in the weak form. It does not imply that the market is efficient in the weak form.
b. True. By using publicly available information, the market can be systematically defeated. In that case, the market is not efficient in its semi-strong form.
c. False. If the investor cannot systematically beat the market using his method, this does not indicate an inefficient market in its semi-strong form. And it does imply that the market is inefficient in its weak form.
d. False. A market that is efficient in its semi-strong form may also be efficient in its strong form, but this does not necessarily follow from the statement.

**Open questions**

17.

a.

Number of outstanding shares paid to the shareholders of B: 12 mln / 5 = 2,4 mln.

b.

Amount of cash paid to the shareholders of B: 2,4 mln × 10 = 24 mln

c.

Market value of equity of A directly after the acquisition =
Market value of equity of A + market value of equity of B + synergies – cash – wealth expropriation = 240 + 160 + 20 – 24 – 2 = 394

d.

Value of the fraction of A held by the old shareholders of A immediately after the acquisition of B: # old shares / (# old shares A + # new shares A) × 394 = 4,0/(4,0 + 2,4) × 394 = 246,25

Return: 246,25 / 240 – 1 = 2,60%

18.

a.

$P_A = 60 / 1{,}01 + 60 / 1{,}01^2 + 1.060/1{,}02^3 = 1.147{,}05$

b.

$$D_A = \left[\frac{60/1{,}01}{1147{,}05}\right] \times 1 + \left[\frac{60/1{,}01^2}{1147{,}05}\right] \times 2 + \left[\frac{1060/1{,}01^3}{1147{,}05}\right] \times 3 = 2{,}85$$

c.

The duration of a zero coupon bond is equal to the maturity of the bond.
$D_B = 6{,}00$
Modified Duration of B = $D_B$ / (1+y) = 6,00 / 1,01 = 5,94

d.

After the increase of the interest rate the value of the assets is: 100 – 30% van 100 = 70

After the increase of the interest rate the value of the liabilities is:
100 – 40% van 100 = 60

Coverage ratio = 70/60 = 1,17

19.

a.

$Re = Rf + \beta \times (Rm - Rf) = 2\% + 1{,}8 \times 6\% = 12{,}8\%$

b.

$Rd = Rf + \beta \times (Rm - Rf) = 2\% + 0{,}0 \times 6\% = 2{,}0\%$

c.

R risky assets (of MYERS) = R risky assets (CHEMICAL division) = $0{,}3 \times 12{,}8\% + 0{,}7 \times 2{,}0\% = 5{,}24\%$

d.

In that case, the required return on the risky projects is higher since the risk of cash and cash equivalents is zero.