1) a) 0-6m

$60 + 30 - 100 - 30 = -40$

b) $\{60 \times 0.02 + 40 \times 0.10 + 30 \times (0,025 + 0,015) - 100 \times (0.01) - 30(0.025 + 0,0075)\}$

$(-40 \text{ u.}) \times (-0.0030)$

c) $40 \times 10\% = 4$ run-off

c → a : $-40 + 4 = -36$

c → b : $-36 \times (-0.0030)$

2) a) $D = \left\{ -1 \frac{9}{1.09} - 2 \frac{9}{1.09^2} - 3 \frac{9}{1.09^3} - 4 \frac{9}{1.09^4} - 5 \frac{109}{1.09^5} \right\} / P$

$$P = \frac{9}{1.09} + \frac{9}{1.09^2} + \frac{9}{1.09^3} + \frac{9}{1.09^4} + \frac{109}{1.09^5}$$

b) $\Delta P = P \times \frac{D}{1.09} \times (0.0030)$

3) a) $VaR = a \times \sigma(R_P) \times W$, $a = 2,33$, $W = 1 \text{ mil } €$

$$\sigma(R_P) = \left\{ 0,40^2 \times (0.012)^2 + 0,60^2 \times (0,007)^2 + 2 \times 0.40 \times 0.60 \times 0.8 \times (0.012) \times (0.007) \right\}^{1/2}$$

b) $CVaR_b = (0.60) \times b_B \times VaR$

$$b_B = \frac{cov(R_B, w_A R_A + w_B R_B)}{\sigma^2(R_P)} = \frac{w_A cov(R_A, R_B) + w_A \sigma^2(R_B)}{\sigma^2(R_P)}$$

where: $cov(R_A, R_B) = 0.8 \times (0.012)(0.007)$

4)

A: $\frac{25}{\sqrt{5} \times 1.65} = 6,77$

B: $\frac{17}{\sqrt{3} \times 2.33} = 4,21$

C: $\frac{36}{\sqrt{15} \times 1.96} = 4,74$

D: $\frac{32}{\sqrt{12} \times 2.33} = 3,96$

5) $p(1+0,047) + (1-p)(1+0,047)(0,30) = 1+0,013$

$\Rightarrow p(1+0.047)(1-0.30) = 1,013 - (1+0.047)(0.30)$

$\Rightarrow p$ = probability of repayment $\Rightarrow$

$1-p$: // // default

6) 99% one-side with a normal distribution $\rightarrow a = 2.33$

we notice that: $120 \times 2.33 \times 0.0715 = 20$ mil €

if s.d. $(R) = 0.12$ then

$120 \times 2.33 \times 0.12 = 33.55$ mil €

the F.I. has a probability of suffering losses equal to:

$0.05 \times 0.01 = 0.0005$ (0.05%)

So the collateral should increase to:

$Collateral \times (1 - 2.33 \times 0.12) = 100 \Rightarrow$

$Col = 100 / 0.7204 = 138,81$ mil €

7) Capital required by the regulations on capital adequacy: $10 \text{ mil.} \times 0.5 \times 0.08 = 0.4 \text{ mil €}$

$$0.15 = \frac{\{(X - 0,015) + 0,003\} \times 10 \text{ mil €}}{0.4 \text{ mil}}$$

$\Rightarrow$ Solve for X.

8) Tier I required regulatory capital:

$$\left[\{80 \times 0,2 + 120 \times 0.5 + 240 \times 1\} + (40 \times 1 + 80 \times 0,2) \times 0,5\right] \times 0.06 = 20,64$$

if what you find from above is ~~<~~ 15 mil €
they the FI is not adequately capitalized
The difference is the deficit in Tier I capital