1. **CH.5.6**

   a. The holding period returns for the three scenarios are:

   Boom: $(50 – 40 + 2)/40 = 0.30 = 30.00\%$

   Normal: $(43 – 40 + 1)/40 = 0.10 = 10.00\%$

   Recession: $(34 – 40 + 0.50)/40 = –0.1375 = –13.75\%$

   $E(HPR) = [(1/3) \times 30\%] + [(1/3) \times 10\%] + [(1/3) \times (–13.75\%)] = 8.75\%$

   $\sigma^2(HPR) = [(1/3) \times (30 – 8.75)^2] + [(1/3) \times (10 – 8.75)^2] + [(1/3) \times (–13.75 – 8.75)^2]$

   $= 319.79$

   $\sigma = \sqrt{319.79} = 17.88\%$

   b. $E(r) = (0.5 \times 8.75\%) + (0.5 \times 4\%) = 6.375\%$

   $\sigma = 0.5 \times 17.88\% = 8.94\%$

2. **CH.5.12**

   a) $E(r_P) = (0.3 \times 7\%) + (0.7 \times 17\%) = 14\%$ per year
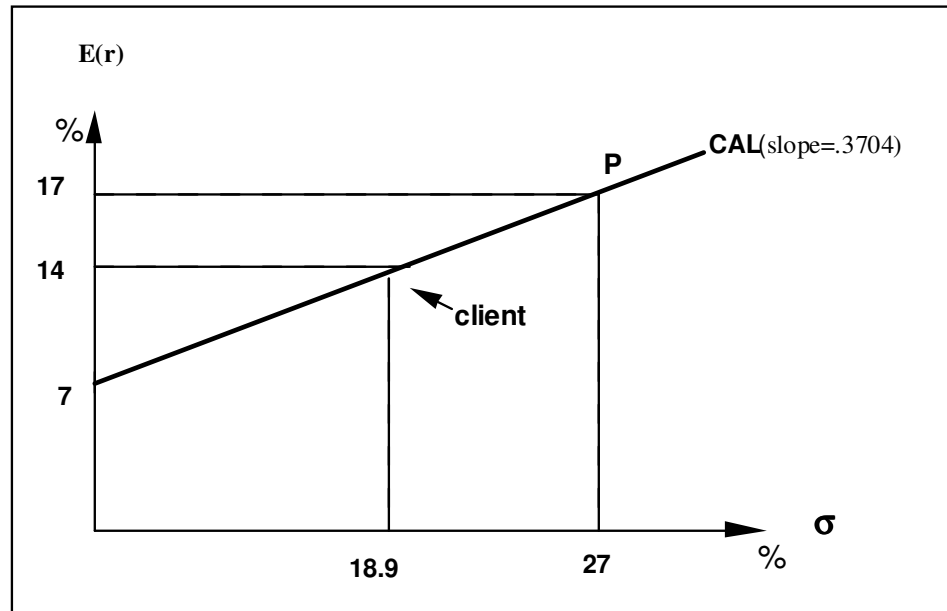
   $\sigma_P = 0.7 \times 27\% = 18.9\%$ per year

   b)

Security		Investment Proportions
T-Bills		30.0%
Stock A	$0.7 \times 27\% =$	18.9%
Stock B	$0.7 \times 33\% =$	23.1%
Stock C	$0.7 \times 40\% =$	28.0%

   c) Your Reward-to-variability ratio = $S = \dfrac{17 - 7}{27} = 0.3704$

   Client's Reward-to-variability ratio = $\dfrac{14 - 7}{18.9} = 0.3704$

d)

3. CH.5.13

a) Mean of portfolio = $(1 − y)rf + y\ rP = rf + (rP − rf)y = 7 + 10y$

   If the expected rate of return for the portfolio is 15%, then, solving for y:

   $$15 = 7 + 10y \Rightarrow y = \frac{15 - 7}{10} = 0.8$$

   Therefore, in order to achieve an expected rate of return of 15%, the client must invest 80% of total funds in the risky portfolio and 20% in T-bills.

b)

Security		Investment Proportions
T-Bills		20.0%
Stock A	$0.8 \times 27\% =$	21.6%
Stock B	$0.8 \times 33\% =$	26.4%
Stock C	$0.8 \times 40\% =$	32.0%

c) $\sigma_P = 0.8 \times 27\% = 21.6\%$ per year

4. **CH.5.14**
   a) Portfolio standard deviation = $\sigma_P = y \times 27\%$
      If the client wants a standard deviation of 20%, then:

      y = (20%/27%) = 0.7407 = 74.07% in the risky portfolio.

   b) Expected rate of return = 7 + 10y = 7 + (0.7407 × 10) = 14.407%

5. **CH.5.18**
   Expected return for your fund = T-bill rate + risk premium = 6% + 10% = 16%
   Expected return of client's overall portfolio = (0.6 × 16%) + (0.4 × 6%) = 12%

   Standard deviation of client's overall portfolio = 0.6 × 14% = 8.4%

6. **CH.5.19**
   $$\text{Reward to variability ratio} = \frac{\text{Risk premium}}{\text{Standard deviation}} = \frac{10}{14} = 0.71$$

7. **CH.5. CFA.4**
   Investment 3.   For each portfolio: Utility = $E(r) - (0.5 \times 4 \times \sigma^2)$

Investment	E(r)	σ	U
1	0.12	0.30	-0.0600
2	0.15	0.50	-0.3500
3	0.21	0.16	0.1588
4	0.24	0.21	0.1518

   We choose the portfolio with the highest utility value.

8. **VAR**

   VAR=E(r)-1.64*σ

Investment	E(r)	σ	VAR
1	0.12	0.3	-0.372
2	0.15	0.5	-0.67
3	0.21	0.16	-0.0524
4	0.24	0.21	-0.1044

   Choose 3.

9. In his 1938 study, what explanation did Fred Macaulay offer for the business cycle?

   Asset returns might be normally distributed in the very short run, but in the longer run herd behavior caused irrationally large swings in asset prices.

10. What line of war-time work of Harry Markowitz helped give him the mathematical preparation needed to develop his theory of optimal portfolio diversification?

Markowitz evaluated the efficiency of WWII bombing by employing operations research.