Financial Engineering Exam Questions.

Question 1.

Duration is 5. Convexity of 75. I think we know just by looking that it will increase. There's an equation online New Price = Old Price + Derivtive of Price at old rate * change in rane + ½ * Price.

Don't need initial price cuz equation is concerned with rates. -5*.01*.5*75*.01^2.

.05375 is the correct answer. Always better to assume something and do the question, though you never should have to.

Question 2a.

Average daily return = .0008. Assume that the return given was arithmetic. So we do
(1+DailyReturn)^252 - 1
22.23%

2b.

Monthly return is same as above but use 12. Get 19.6%

2c.
Annueal Averaiance = 252 * Daily Vriance
Annueal stdev = sqrt(252) * daily std dev = 35%

2d.

Get 36%. Annueal stdev = sqrt(52) * std week.

3a. Can't answer with info we learned this semester.

3b. Can use a program if you want, though you just need to add and multiply.

Covariance matrix = variances in diagonal and convariances in off-diagonal .

U = [.31; .43] and Sigma = [[.27^2, .64 * .27 * .45], [Same, .45^2]]

A = [[a, b], [b, c]] = [mu, 1]' Sigma-1 [mu 1].

There's a way to calculate the inverse of A in the week 40 slides.

A = [[1.4, 4.197], [4.197, 13.75]].

Stdev = 1/sqrt(c) = 1/sqrt(13.75) = .2697. Mu = b/c = .03051

Weights = 1/c * inverse of sigma * 1. = [1.045, -.0405]

3c. Excess return = .2471
Check slides from week 41. Stdev = .2963 and waits = [.686, 0.319]

3d. Sharpe Ratios

Asset 1 = .37 - .1 / .22 = .778. Asset 2 = .0733. GMV = .761. Tan = (.2471 / .29) = .0836

4th.

Calculate market size by doing # shares * price for every stock.

Get weights of market portfolio by doing value / total market value.

In CAPM all investors hold some proportion of their wealth in tangent portfolio.
Market portfolio = tangent portfolio

Know for a fact that santa doesn't hold market portfolio cuz 0% in mcdonalds.

Excel sheet online

5th

Beta of portfolio is the weighted average of the asset betas.

When the question says show I think that means you have to derive.
Check phone.

Show the formula for beta of an aseet. Formula for return of portfolio.
If beta is 1 then expected return is equal to market but not in reality cuz expectations.

If beta = 0. Then expected return is the risk free rate.

Question 8.

Take a combination of assets that may not be efficient. Then combine them to become efficient. False.

Question 14 – B.

Question 15 – F.

Question 16 –

Question 19 -