Assignment 2: Answers

(February 17, 1998)

1. This one's up to you.

2. Two approaches to duration.

   (a) The price is 107.21, the yield 6.116%.

   (b) Duration is 1.812 (years).

   (c) The portfolio involves .05 units of zeros with maturities 1 to 3, and 1.05 units of maturity 4. The prices and durations of these components, computed from the spot rates, imply

Maturity (Yrs)	Duration	Weight (Fraction of Value)
0.5	0.478	0.0446
1.0	0.962	0.0431
1.5	1.499	0.0421
2.0	1.942	0.8702

   For example, the first weight is $w_1 = [5/(1+.09/2)]/107.21$. The duration of the portfolio of zeros is

   $$\begin{aligned} D &= 0.0446 \times 0.478 + 0.0431 \times 0.962 + 0.0421 \times 1.499 + 0.8702 \times 1.942 \\ &= 1.813. \end{aligned}$$

   This duration calculation uses value weights based on the spot rates rather than [as in (a)] the yield to maturity. We see in this case, at least, that the two approaches produce similar answers. The latter is more accurate, and underlies statistical risk measures like RiskMetrics, but the former is easier to compute: you don't need to know the entire spot rate curve. The answer in (a) is what you'll see on a Bloomberg terminal (labelled "adj/mod duration").

3. Duration calculations for real bonds. This involves a little more complication (the uneven first time interval), but that's real life for you.

   (a) For Banc One: duration is 3.546 and DV01 or PVBP (listed on Bloomberg as "dollar value of a 0.01") is 0.0376. For Citicorp: duration is 4.802 and DV01 is 0.0503. This one has a catch to it, which you won't be penalized for missing: annual compounding (it's a eurobond).

   (b) The answer is their durations.

   (c) The longer bond has greater duration.