MATH 2600/STAT 2600, Theory of Interest
FALL 2013
Toby Kenney
Homework Sheet 7
Due: Thursday 28th November

1. Calculate the modified duration and Macauley duration of a 10-year bond with semi-annual coupons at coupon rate 12%, if it is purchased for a yield of:

   (a) $j_2 = 2\%$.

   (b) $j_2 = 12\%$.

   (c) $j_2 = 22\%$.

2. A company expects to receive \$2,000,000 in 2 years time, and pay out \$5,000,000 in 5 years time. If the current spot rates are as in the following table:

Term(years)	2	5	7	8
rate	3.5%	4.4%	5%	5%

   (a) find a way for the company Reddington immunise these cash-flows by buying zero-coupon bonds with maturities in 7 or 8 years.

   (b) Is the immunisation in (a) a full immunisation?

3. Find two payments in 5 and 16 years that immunise the liabilities of a 20-year bond with face value \$80,000 and semi-annual coupon rate 4% at a price to yield 4.6%.

4. The current term structure has the following yields on zero-coupon bonds:

Term(years)	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
rate	4%	4.2%	4.7%	5%	5.3%	5.6%	5.8%	6%

   Calculate the modified duration of a 10% semi-annual 4-year bond, based on a parallel shift in the term structure.