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**Problem Set: Term Structure Problems**

**(Solutions Below)**

**Term Structure Problems**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Assume:     1) current date is February 1998,   2) annual discounting,   3) the following discount rates for risky cash flows               corporate bonds:     rf + 5%               other cash flows:    rf + 7%, and   4) the following data on U.S. Treasury Strips:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|    |    |    |    | U.S. Treasury Strips  |    |    |    |
| Mat.  | Bid  | Ask  | Chg.  | Ask Yld  | Mat.  | Bid  | Ask  | Chg.  | Ask Yld  |
| Feb-98  | 97:22:00  | 97:22:00  | …..  | 5.58  | May-00  | 85:08:00  | 85:09:00  | -1  | 6.04  |
| May-98  | 96:10:00  | 96:10:00  | …..  | 5.66  | Aug-00  | 83:27:00  | 83:29:00  | -1  | 6.09  |
| Aug-98  | 94:29:00  | 94:29:00  | …..  | 5.74  | Nov-00  | 82:17:00  | 82:18:00  | -1  | 6.13  |
| Nov-98  | 93:16:00  | 93:16:00  | -1  | 5.79  | Feb-01  | 81:06:00  | 81:07:00  | -2  | 6.16  |
| Feb-99  | 92:01:00  | 92:02:00  | -1  | 5.90  | May-01  | 79:29:00  | 79:30:00  | -2  | 6.18  |
| May-99  | 90:20:00  | 90:21:00  | -1  | 5.95  | Aug-01  | 78:20:00  | 78:22:00  | -2  | 6.20  |
| Aug-99  | 89:09:00  | 89:10:00  | -1  | 5.95  | Nov-01  | 77:13:00  | 77:15:00  | -2  | 6.21  |
| Nov-99  | 87:28:00  | 87:29:00  | -1  | 6.02  | Feb-02  | 76:05:00  | 76:08:00  | -2  | 6.23  |
| Feb-00  | 86:16:00  | 86:17:00  | -1  | 6.05  | May-02  | 74:29:00  | 74:31:00  | -2  | 6.26  |

1. What are the implied forward rates for the next four years?2. What would your total YTM be on a two-year Treasury note purchased in two years?3. What would your total YTM be on a three-year Treasury note purchased today?4. What would your total YTM be on a three-year Treasury note purchased next year?5. What  is the present value of the following cash flows:               0             1             2             3                (100)       150         (200)       5006. What is the present value of a four-year annuity of $100.00 per year?7. What is the price of a $1,000 zero-coupon corporate bond maturing in three years?8. What is the price of the following corporate bond?                      face value:              $1,000                      maturity:                  4 years                      coupon rate:           8%9. What is the price of the following corporate bond?                      face value:              $1,000                      maturity:                  3 years                      coupon rate:           10%10. What is the YTM of the corporate bond in #9? **Solutions**1.http://home.ubalt.edu/ntsbschr/images/term_s97.gif          http://home.ubalt.edu/ntsbschr/images/term_s98.gifhttp://home.ubalt.edu/ntsbschr/images/term_s99.gif      http://home.ubalt.edu/ntsbschr/images/term_s1.gifÞ   Discount Rates:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|    | 1  | 2  | 3  | 4  |
| Risk-Free Assets | 5.90% | 6.20% | 6.38% | 6.44% |
| Corporate Bonds | 10.90% | 11.20% | 11.38% | 11.44% |
| Other Cash Flows | 12.90% | 13.20% | 13.38% | 13.44% |

2.       http://home.ubalt.edu/ntsbschr/images/term_s2.gif  or  http://home.ubalt.edu/ntsbschr/images/term_s3.gif3.       http://home.ubalt.edu/ntsbschr/images/term_s4.gif4.       http://home.ubalt.edu/ntsbschr/images/term_s5.gifor               http://home.ubalt.edu/ntsbschr/images/term_s6.gif5.       http://home.ubalt.edu/ntsbschr/images/term_s7.gif6.http://home.ubalt.edu/ntsbschr/images/term_s8.gif7.       http://home.ubalt.edu/ntsbschr/images/term_s9.gif8.http://home.ubalt.edu/ntsbschr/images/term_s10.gif9.       http://home.ubalt.edu/ntsbschr/images/term_s11.gif10.       http://home.ubalt.edu/ntsbschr/images/term_s12.gif      http://home.ubalt.edu/ntsbschr/images/term_s13.gif       http://home.ubalt.edu/ntsbschr/images/term_s14.gif  |