Math 177 Homework 4

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Section 4.1

1. Since yield rate $7.7\% > 7.2\%$, $(b) > (a)$ and $(d) > (c)$. In addition, since the yield rate is greater than the coupon rate for all options, $(a) > (c)$ and $(b) > (d)$. Therefore, $(b) > (a) > (d) > (c)$.

2. $115.84 = Cv_{3.5\%}^{24} + 100 * 3.5\%a_{\overline{24}|3\%} \implies \boxed{C = 114.99}$

3. $5083.49(1+j)^{20} = 10000 \implies j = 0.0344081$; $X = 10000v_j^{20} + 10000 * 10\%a_{\overline{20}|j} = \boxed{12227.90}$

4. Let n be the number of half-years. $Fv_{2.5\%}^{16} + F * 3\%a_{\overline{16}|2.5\%} = Fv_{2.5\%}^{n} + F * 2.75\%a_{\overline{n}|2.5\%} \implies n = 42.84 \implies \boxed{21.42 \text{ years}}$

6. Let j be the quarterly yield rate and i the nominal annual yield rate. Then, $800 = 1000v_j^{100} + 1000 * 2.5\%a_{\overline{100}|j} \implies j = 0.0316179 \implies \boxed{i = 0.126417}$

7. $L = P = 1000v_{4\%}^{20} + 1000 * 5\%a_{\overline{20}|4\%} = 1135.903263$
   Net gain $= 50s_{\overline{20}|3\%} + 1000 - L(1+7\%)^{10} = \boxed{109.03}$

11.   I.

    II.

    III.

12. Let prices of the bonds be X and Y with coupon rates $2r$ and r respectively.
    $X = 100 + 100(2r - 1.5\%)a_{\overline{n}|3\%}$; $Y = 100 + 100(r - 1.5\%)a_{\overline{3\%}|n}$
    $X + Y = 240$ and $X - Y = 24 \implies X = 132, Y = 108$
    $\implies n = 13.05$ and $r = 0.0225$
    Therefore the coupon rates are 2.25% and 4.50% respectively.

15. $P = 1000v_{5\%}^{40} + 1000 * 4\%a_{\overline{40}|5\%} = 828.409137$
    $P = Cv_{5\%}^{20} + 1000 * 4\%a_{\overline{20}|5\%} \implies \boxed{C = 875.38}$

18. $g = \frac{Fr}{C} \implies F = \frac{Cg}{r}$, $r = \frac{Cg}{F}$, $Fr = Cg$, then

(4.2E) $P = Cv_j^n + Fra_{\overline{n}|j} = Cv_j^n + Cga_{\overline{n}|j}$

(4.3E) $P = C + (Fr - Cj)a_{\overline{n}|j} = P = C + (Cg - Cj)a_{\overline{n}|j} = C + C(g - j)a_{\overline{n}|j}$

(4.4E) $P = K + \frac{r}{j}(F - K) = K + \frac{Fr}{j} - \frac{r}{j}K = K + \frac{Cg}{j} - \frac{Cg}{Fj}K$

Section 4.2

   1.

   4.

   5.

Section 5.1

   4.

   7.

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11.

Section 5.2

   1.

   2.

   3.

   4.

   6.

Section 5.3

   2.

   3.