Analytical Chemistry
Problem Set 3—due Monday, February 14, 2005 (at 5 p.m.)
-20% per day if the assignment is late

Total possible points for this assignment = 47

- This problem set will not be graded before your test on Thursday, February 17. However, you can consult the course web page for my answer key before Thursday.

- Consult Appendix F in your text for any K_{sp} values you need for calculations.

1. (5 points) Harris 4-22. You are required to test at both the 90% and the 95% confidence levels. (Consult the table on back for the 95% calculation.)

2. (4 points) Harris 8-3

3. (7 points) Harris 8-4

4. (9 points) Harris 8-13. Hint: You do not need to iterate to solve this problem accurately. For 2 of your 9 points on this problem, explain why iteration is unnecessary.

5. (22 points) Harris 8-15. Please note the following: (1) Solving part (a) will require iteration. You should continue until two successive predictions of $[Ca^{2+}]$ agree to 2 significant figures. This means that you should keep track of all intermediate results to at least 3 figures (2) You should use the extended Debye-Huckel equation, as we discussed in class, to determine the activity coefficients. However, this approach will cause your final answer to differ slightly from the answer in the back of the book. This is because the answer in the back of the book was determined by interpolation of the activity coefficients in Table 8.1.

Table I. Critical Values of Dixon's r_{10} (Q) Parameter As Applied to a Two-Tailed Test at Various Confidence Levels, Including the 95% Confidence Level[a]

	confidence level					
N[b]	80% (α = 0.20)	90% (α = 0.10)	95% (α = 0.05)	96% (α = 0.04)	98% (α = 0.02)	99% (α = 0.01)
3	0.886	0.941	**0.970**	0.976	0.988	0.994
4	0.679	0.765	**0.829**	0.846	0.889	0.926
5	0.557	0.642	**0.710**	0.729	0.780	0.821
6	0.482	0.560	**0.625**	0.644	0.698	0.740
7	0.434	0.507	**0.568**	0.586	0.637	0.680
8	0.399	0.468	**0.526**	0.543	0.590	0.634
9	0.370	0.437	**0.493**	0.510	0.555	0.598
10	0.349	0.412	**0.466**	0.483	0.527	0.568
11	0.332	0.392	**0.444**	0.460	0.502	0.542
12	0.318	0.376	**0.426**	0.441	0.482	0.522
13	0.305	0.361	**0.410**	0.425	0.465	0.503
14	0.294	0.349	**0.396**	0.411	0.450	0.488
15	0.285	0.338	**0.384**	0.399	0.438	0.475
16	0.277	0.329	**0.374**	0.388	0.426	0.463
17	0.269	0.320	**0.365**	0.379	0.416	0.452
18	0.263	0.313	**0.356**	0.370	0.407	0.442
19	0.258	0.306	**0.349**	0.363	0.398	0.433
20	0.252	0.300	**0.342**	0.356	0.391	0.425
21	0.247	0.295	**0.337**	0.350	0.384	0.418
22	0.242	0.290	**0.331**	0.344	0.378	0.411
23	0.238	0.285	**0.326**	0.338	0.372	0.404
24	0.234	0.281	**0.321**	0.333	0.367	0.399
25	0.230	0.277	**0.317**	0.329	0.362	0.393
29	0.227	0.273	**0.312**	0.324	0.357	0.388
27	0.224	0.269	**0.308**	0.320	0.353	0.384
28	0.220	0.266	**0.305**	0.316	0.349	0.380
29	0.218	0.263	**0.301**	0.312	0.345	0.376
30	0.215	0.260	**0.298**	0.309	0.341	0.372

[a] In this and the other accompanying tables, the newly generated or corrected values are indicated in boldface. [b] Sample size.

(Rorabacher, D.B. *Analytical Chemistry* **1991**, *63*, 139.)