DISCRETE MATHEMATICS
Math 245

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Assignment for Ch 10

Due Wed. 4/28/10

1. Epp 10.2 #11 (both editions).

2. Epp 10.2 #44 (both editions).

3. Let $A = \mathcal{P}(\{a, b, c\})$, the set of subsets of $\{a, b, c\}$. Define a relation on A by XRY when $|X| = |Y|$ (here X and Y are subsets of $\{a, b, c\}$ and $|X|$ is the number of elements in X.)

   (a) Prove that R is an equivalence relation (this is straightforward.)

   (b) Identify the equivalence classes of R.

4. Consider the integers, $\mathbb{Z}$, with the mod 7 equivalence relation. Give a system of representatives.

5. Consider the "punctured plane," that is $\mathbb{R}\times\mathbb{R}-\{(0, 0)\}$. Define an equivalence relation R by $(x_1, y_1)R(x_2, y_2)$ when there is some positive real number a such that $ax_1 = ax_2$ and $ay_1 = y_2$. In other words: $(x, y)R(ax, ay)$ for all positive reals a.

   (a) Find all points (x, y) such that $(0, 1)R(x, y)$. Find all points (x, y) such that $(1, 1)R(x, y)$.

   (b) Show that R is an equivalence relation.

   (c) Briefly state what the equivalence classes are.

   (d) Find a system of representatives: a set with exactly one element from each equivalence class.

6. Construct the Hasse diagram of D_n for $n = 42$, and $n = 100$.

7. For the values of n in the previous problem, find the maximal and minimal elements of $D_n - \{1, n\}$.

8. Construct the Hasse diagram for the divides relation on the set $\{2, \ldots, 10\}$. Identify the minimal elements and the maximal elements.