CSE 321: Discrete Structures | Assignment #8
December 1, 2006 | Due: Friday, December 8

Reading Assignment: Rosen's text 6th Edition: and read sections 8.5, 9.1-9.5, 9.7 or 5th Edition: sections 7.5, 8.1-8.5, 8.7

Problems:

1. For the relation $R = \{(b, c), (b, e), (c, e), (d, a), (e, b), (e, c)\}$ on $\{a, b, c, d, e, f\}$, compute the following.
   (a) The reflexive closure of R.
   (b) The symmetric closure of R.
   (c) The transitive closure of R.
   (d) The reflexive-transitive closure of R.
2. A relation R is called *circular* if aRb and bRc imply that cRa for every a, b, and c. Prove that R is reflexive and circular if and only if it is an equivalence relation.
3. 6th Edition, section 9.2, exercise 36 parts (b), (d), (f), (h), or 5th Edition, section 8.2, exercise 28 parts (b), (d), (f), (h). If no such graph exists, explain why.
4. 6th Edition, section 9.3, Exercises 36, 38, 42. 5th Edition, section 8.3, Exercises 36, 38, 42. (**Extra credit:** Exercise 44 from either edition.)
5. Prove that if an undirected graph G is not connected, then its complement is connected. (Hint: Try some examples to get an intuition as to why this is true.)
6. **Extra credit:** Suppose that G is a simple, undirected graph and every vertex of G has degree at least d for some $d \geq 2$. Prove that G must contain a (simple) cycle of length at least $d + 1$.