

Homework 13 Solutions

Math 55, DIS 101-102

9.4.22 [2 points]

Show that if R is reflexive then R^* is reflexive.

$R^* = \bigcup_{i=1}^{\infty} R^i$, so in particular $R \subseteq R^*$. Since $\{(a, a) : a \in A\} \subset R$, it follows that $\{(a, a) : a \in A\} \subset R^*$ and therefore that R^* is reflexive.

9.5.2 [2 points]

Which of the following are equivalence relations?

1. a and b are the same age: YES
2. a and b have the same parents: YES
3. a and b share a common parent: NOT TRANSITIVE
4. a and b have met: NOT TRANSITIVE
5. a and b speak a common language: NOT TRANSITIVE

9.5.18 [2 points]

1. Let $f \sim g$ if $f''' = g'''$. Show that this is an equivalence relation.
Let $D^3(f) = f'''$. Then $f \sim g$ if $D^3(f) = D^3(g)$, so \sim is an equivalence relation.
2. The equivalence class of x^4 is the set of all functions of the form $x^4 + bx^2 + cx + d$. (Do not include the x^3 term.)

10.2.24 [2 points]

Is the pictured graph bipartite?

Yes, since we can partition the vertices into the two sets $\{a, b, d, e\} \cup \{c, f\}$.

10.2.40 [2 points]

How many edges does a graph have if its degree sequence is 4,3,3,2,2? Draw such a graph.

Such a graph has $(4 + 3 + 3 + 2 + 2)/2 = 7$ edges. Here is such a graph:

