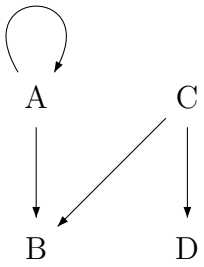
CS 173: Discrete Structures, Spring 2010
Quiz 3 review

These problems should not be turned in. They are to help you review for the third quiz.

1. **Relation properties**



Reflexive: ☐ **Irreflexive**: ☐

Symmetric: ☐ **Antisymmetric**: ☐

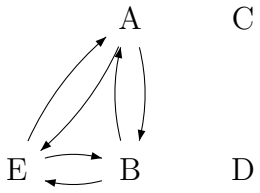
Transitive: ☐

$\sim$ is the relation on $\mathbb{R}$ such that $x \sim y$ if and only if $xy = 1$

Reflexive: ☐ **Irreflexive**: ☐

Symmetric: ☐ **Antisymmetric**: ☐

Transitive: ☐



Reflexive: ☐ **Irreflexive**: ☐

Symmetric: ☐ **Antisymmetric**: ☐

Transitive: ☐

2. **Equivalence classes**

Let $A = \mathbb{R}^+ \times \mathbb{R}^+ - \{(0,0)\}$, i.e. pairs of positive reals in which no more than one of the two numbers is zero.

Consider the equivalence relation $\sim$ on A defined by

$$(x,y) \sim (p,q) \quad \text{iff} \quad (xy)(p+q) = (pq)(x+y)$$

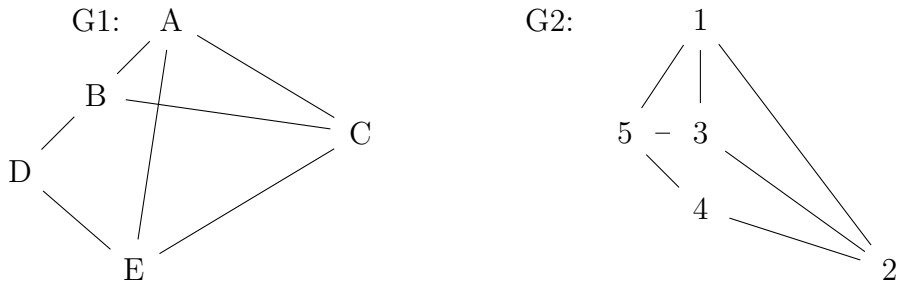
(a) List four elements of $[(3,1)]$. Hint: what equation do you get if you set (x,y) to $(3,1)$ and $q = 2p$?

(b) Give two other distinct equivalence classes that are not equal to $[(3,1)]$.

(c) Describe the members of $[(0,4)]$.

3. **Graph isomorphism**

(a) Prove that the following two graphs are isomorphic. That is, for each vertex in $G1$, give the corresponding vertex in $G2$, making sure your mapping preserves the edge structure.



(b) Prove that the following two graphs are not isomorphic.