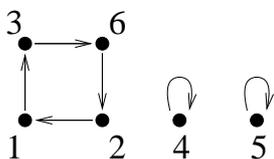
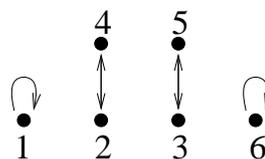


## Practice problems for Test 1

## Answers

1. (a) 17  
(b)  $m = 2, n = -1$
3. Solve the congruences:  
(a)  $x \equiv 3 \pmod{8}$   
(b) No solutions
4.  $x \equiv 156 \pmod{275}$
5. (a) It is the number of positive integers less than or equal to  $n$  that are relatively prime to  $n$ .  
(b) 8
6. 10; [901]
7. (a) Well-defined function. Not one-to-one, not onto.  
(b) Not a well-defined function.
9. (a) Yes. Infinitely many equivalence classes containing 2 elements  $\{x, -x\}$  for positive  $x$ , and one class containing 1 element  $\{0\}$ .  
(b) No. Reflexive law is not satisfied for  $x = 0$ .  
(c) Yes. 3 equivalence classes:  $\mathbb{Z}_+, \{0\}$ , and  $\mathbb{Z}_-$ .
10. (a)  $\sigma\tau = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 5 & 1 & 6 & 2 \end{pmatrix}, \tau\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 5 & 1 & 6 & 2 & 3 & 4 \end{pmatrix}$ .  
(b) No  
(c)  $\sigma^{-1} = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 6 & 1 & 4 & 5 & 3 \end{pmatrix}, \tau^{-1} = \tau$ .  
(d)  $\sigma = (1362), \tau = (24)(35)$   
(e)

 $\sigma$  $\tau$ 

- (f)  $\sigma = (13)(36)(62)$
- (g)  $\sigma$  is odd;  $\tau$  is even.