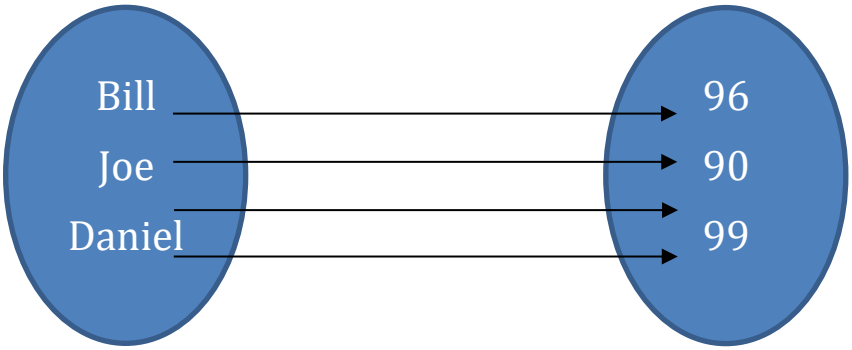
CS 5012: Foundations of Computer Science

Relations and Functions - Exercises

1. Using the sets below of students and test scores (highest grade = 100), write out the expression, domain, range, and codomain.



2. Let *S* be the set of students at UVA, let *M* be the set of sporting events at UVA, and let *V(s,m)* be "student *s* has been to *m*." Rewrite each of the following statements without using the symbol " , and $, or variables.
   a. $\$s \in S$ such that *V(s, Basketball)*
   b. $\forall s \in S$, *V(s, Football)*
   c. $\forall s \in S$, $\$m \in M$ such that *V(s,m)*
   d. $\$m \in M$ such that $\forall s \in S$, *V(s,m)*

3. For each of the following relations on the set {5, 6, 7, 8} decided whether it is reflexive, symmetric, and/or transitive. Which of these are equivalence relations?
   a. {(6,6), (6,7), (6,8), (7,6), (7,7), (7,8)}
   b. {(5,5), (5,6), (6,5), (6,6), (7,7), (8,8)}
   c. {(6,8), (8,6)}

4. Calculate the composition (g(f(x))) of the following two functions, f(x) and g(x):
   f(x) = x + 5 g(x) = $x^2 + 2x + 10$