CSE15/Quiz 2 Name: ___________Solution_____________

Note: 4 questions on both sides, maximum 22 points, **show all steps (as appropriate) to get full credit.**

1. [4 points] Use a proof by cases to show that $\mathbf{min}(\boldsymbol{a}, \mathbf{min}(\boldsymbol{b}, \boldsymbol{c})) = \mathbf{min}(\mathbf{min}(\boldsymbol{a}, \boldsymbol{b}), \boldsymbol{c})$ whenever ***a***, ***b***, and ***c*** are real numbers.

There are three main cases, depending on which of the three numbers is smallest. If a is smallest (or tied for smallest), then clearly $a \leq \min(b, c)$, and so the left-hand side equals a. On the other hand, for the right-hand side we have $\min(a, c) = a$ as well. In the second case, b is smallest (or tied for smallest). The same reasoning shows us that the right-hand side equals b; and the left-hand side is $\min(a, b) = b$ as well. In the final case, in which c is smallest (or tied for smallest), the left-hand side is $\min(a, c) = c$, whereas the right-hand side is clearly also c. Since one of the three has to be smallest we have taken care of all the cases.

2. [6 points] Let A = {0,2,4,6,8,10}, B = {0,1,2,3,4,5,6}, and C = {4,5,6,7,8,9,10}. Find:
   a. **A ∩ B ∩ C**
      [4, 6]
   b. **(A ∪ B) ∩ C**
      [4, 5, 6, 8, 10]

3. [6 points] Find the power set of each of these sets, where ***a*** and ***b*** are distinct elements.
   a. ***{ a }***
   {Ø, {a}}

   b. ***{ a, b }***
   {Ø, {a}, {b}, {a, b}}

   c. ***{ Ø, { Ø } }***
   {Ø,{Ø},{{Ø}},{Ø,{Ø}}}

4. [6 points] Determine whether each of these functions is a **bijection** from ***R*** to ***R***.
   a. ***f (x) = −3x + 4***

This is a bijection since the inverse function is $f^{-1}(x) = (4 - x)/3$.

   b. ***f (x) = −3x²+ 7***

b) This is not one-to-one since $f(17) = f(-17)$, for instance. It is also not onto, since the range is the interval $(-\infty, 7]$. For example, 42548 is not in the range.