CSIEB0080-Quiz 1 | Instructor: PaoLien Lai

Oct. 15, 2012 14:10 pm ~ 15:00 pm | Closed book, no calculators

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Student name:______________________________ Student number: ______________

There are 9 questions and 100 marks total.

1. (15 points) Let $S=\{0,1,2,3\}$, $T=\{1,x,y\}$, and $V=\{0,w,z\}$.
   Find (a) $S\times V$ (b) $S-T-V$ (c) $S\cap T\cap V$

2. (10 points) **Translate** each of these quantifications into English and **determine** its truth value.
   (a) $\forall x \in \mathbf{R}(x^2 \neq -1)$ (b) $\exists x \in \mathbf{Z}(x^2 = 2)$

3. (10 points) **Find** these values. (a) $\left\lfloor \frac{1}{2} + \left\lceil \frac{3}{2} \right\rceil \right\rfloor$ (b) $\left\lfloor -\frac{7}{8} + \left\lceil -\frac{3}{4} \right\rceil \right\rfloor$

4. (15 points) **Determine** whether each of these functions is a bijection from **R** to **R**.
   (a) $f(x)=-3x+5$ (b) $f(x)=-5x^2+6$ (c) $f(x)=(x^2-1)/(x+1)$

5. (10 points) **Compute** each of these double sums.
   (a) $\sum_{i=1}^{2}\sum_{j=1}^{3}(i+j)$ (b) $\sum_{i=0}^{2}\sum_{j=0}^{3}(ij)$

6. (10 points) **Give an example** of a ***decreasing function*** with the set of real numbers as its domain and codomain that is not one-to-one.

7. (10 points) Let $S=\{-1,0,2,4,7\}$. **Find** $f(S)$ if (a) $f(x)=1$ (b) $f(x)=2x+1$.

8. (10 points) **Find** $f+g$ and fg for f and g, where $f(x)=x^2+1$ and $g(x)=x+2$ are two functions from **R** to **R**.

9. (10 points) Let $A_i=\{1,2,3,\ldots,i\}$ for $i=1,2,3,\ldots$. **Find** (a) $\bigcup_{i=1}^{n} A_i$ (b) $\bigcap_{i=1}^{n} A_i$