CSE 235 Homework 6 Spring 2011

Due: Friday, March 4, 2011

Name (Print)____________________________ **CSE Login** ______________

Name 2 (Print)__________________________ **CSE Login** ______________

Instructions Follow instructions *carefully*, failure to do so may result in points being deducted.

- The homework can be submitted on paper or via handin. Homework *neatly* formatted in LaTeX will receive a 7 point bonus. You will not receive the 7 points bonus if you work with a partner (see below).
- Clearly label each problem and submit the answers *in order*.
- Staple this cover page to the front of your assignment for easier grading.
- Late submissions *will not be accepted*.
- Show sufficient work to justify your answer(s).
- When you are asked to prove something, you must give as formal, rigorous, and complete a proof as possible. Each step in your proof must contain explanation that would allow us to understand what theorem/logic you have applied to arrive at that step.
- You are to work individually, and all work should be your own. Check partner policy below.
- The CSE academic dishonesty policy is in effect (see `http://cse.unl.edu/ugrad/resources/academic_integrity.php`).

Partner Policy You may work in pairs, but you must follow these guidelines:

1. You must work on *all* problems *together*. You may not simply partition the work between you.
2. You must use LaTeX and you may divide the typing duties however you wish.
3. You may not discuss problems with other groups or individuals.
4. Hand in only one hard copy with both author's name.

Problem	Page	Points	Score
2.3.2 Yes/No answer	146	3	
2.3.18 c,d	147	4	
2.3.24	147	6	
2.3.36	147	10	
2.3.66	148	8	
(Bonus) 2.3.68	148	8	
(Bonus) 2.3.70 (a,b,c)	149	6	
Problem A	See next page	9	
Problem B	See next page	20	
Problem C	See next page	12	
Total		72	
Typesetting in LaTeX (bonus)		7	

Problem A (2.3.10)

Let $f : \{a, b, c, d\} \to \{a, b, c, d\}$, for each of function f defined below

1. $f(a) = b,\ f(b) = a,\ f(c) = c,\ f(d) = d.$
2. $f(a) = b,\ f(b) = b,\ f(c) = d,\ f(d) = c.$
3. $f(a) = d,\ f(b) = a,\ f(c) = c,\ f(d) = d.$

1. Determine whether f is one-to-one (injective).
2. Determine whether f is onto (surjective).
3. Determine whether f is one-to-one correspondence (bijective).

Problem B (2.3.12)

For <u>*each*</u> function $f : \mathbb{Z} \to \mathbb{Z}$

- $f(n) = n - 1$.
- $f(n) = n^2 + 1.$
- $f(n) = n^3.$
- $f(n) = \lceil \frac{n}{2} \rceil.$

1. Determine whether each f is one-to-one (injective).
2. Determine whether each f is onto (surjective).
3. Determine whether each f is one-to-one correspondence (bijective).
4. Determine whether each f is invertible. If so, give f^{-1}. If not, give the largest domain for which f is invertible and find f^{-1}.

(You should have a total of 16 answers.)

Problem C

For functions $f(x) = x^2 + x$ and $g(x) = x - 2$ from $\mathbb{R}$ to $\mathbb{R}$, find:

1. $f \circ g$
2. $g \circ f$
3. $f \circ f$
4. $g \circ g$

Note that we have rng(f) = rng(g) = domain(f) = domain(g).