Homework #2
Due Tuesday, 3/28
(at the beginning of class)

This homework is the sole work of: _____ whose conference section is at:

_____ whose conference section is at:

Sources (People, URL's, Books etc.) consulted:

Source _____ for Problem # _____

Source _____ for Problem # _____

Source _____ for Problem # _____

Date: _____

Each question is worth 5 Points

#1. Page 75, #18. **Prove that the square of an even number is an even number.**

#2. a) Section 1.6, page 85, #12: **Find 2 sets A and B such that A ε B and A $\subseteq$ B**

b) Section 1.6, page 85, #14 **What is the cardinality of each of the following sets?**

a) Ø
b) {Ø}
c) {Ø,{Ø}}
d) {Ø,{Ø}, {Ø,{Ø}}}

#3. a) Section 1.6, page 85, #16: **Can you conclude that A = B if A and B are 2 sets with the same power set? Why or why not?**

b) Section 1.6, page 86, #22: **Suppose that A x B = Ø, where A and B are sets. What can you conclude?**

#4. a) Section 1.7, page 95, #14a,e: **Let A, B and C be sets. Show that**

a) (A U B) $\subseteq$ (A U B U C)
b) (B – A) U (C – A) = (B U C) – A

(i) in words by showing the appropriate subset relations as done in class
(ii) using Venn diagrams

#5. a) Determine whether each of these functions is a bijection**. If it is a bijection, prove it; if not a bijection, give a counterexample.**

a) f: R → Z: f(x) = |_x_| (that is, f(x) = floor(x))
b) f: R → R: $f(x) = x^2$
c) f: {1,2,3} → {2}: {(1,2). (2,2), (3,2)}
d) f: {1,2,3} → {1,2, 3}: {(1,2), (1,3), (2,1), (2,2)}

b) **Let f be a function from the set A to the set B. Let S and T be subsets of A, R a subset of B. Show that:**

a) f(S ∪ T) = f(S) ∪ f(T)
b) $f(f^{-1}(R) \subseteq R$

#6. Show that 5^n is $O(6^n)$, but 6^n is not $O(5^n)$

#7. Section 2.2, page 142, #16 **Show that if f(x) is $O(x^2)$, then f(x) is $O(x^3)$**

#8. Express each statement using Ω-, O- or Θ- notation

a) Show that $2^x + 17$ is $O(3^x)$.
b) Show that $(x3 + 2x)/(2x+1)$ is O(x)
c) Show that $2x^2 + x - 7$ is $\Theta(x^2)$
d) Show that floor(x + ½) is Θ(x)
e) Show that ceiling(xy) is Ω (xy)