MATH 201 HW 11 - Chapters 12.4, 12.5, 12.6, and whole Chapter 13

due **Apr 8** before class.

Staple all your papers. Write carefully, unreadable answers will not receive any credit. Write your opinion about every question - good - bad - ugly - (or some other) and difficulty.

Please write your section or time of your class on you HW.

1: Consider the functions $f, g : \mathbb{R} \to \mathbb{R}$ defined as $f(x) = \frac{1}{x^2+1}$ and $g(x) = 3x + 2$. Find the formulas for $g \circ f$ and $f \circ g$.
(This question is: good - bad - ugly? Difficulty 0-9:)

2: Suppose $A = \{a, b, c\}$. Let $f : A \to A$ be the function $f = \{(a, c), (b, c), (c, c)\}$, and let $g : A \to A$ be the function $g = \{(a, a), (b, b), (c, a)\}$. Find $g \circ f$ and $f \circ g$.
(This question is: good - bad - ugly? Difficulty 0-9:)

3: Consider the function $f : \{1, 2, 3, 4, 5, 6, 7\} \to \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$ given as $f = \{(1, 3), (2, 8), (3, 3), (4, 1), (5, 2), (6, 4), (7, 6)\}$. Find: $f(\{1, 2, 3\})$, $f(\{4, 5, 6, 7\})$, $f(\emptyset)$, $f^{-1}(\{0, 5, 9\})$ and $f^{-1}(\{0, 3, 5, 9\})$.

4: Find a bijection between $\mathbb{R}$ and $(0, \infty)$. I mean find an explicit function that gives the bijection.

5: Prove or disprove: If A is uncountable, then $|A| = |\mathbb{R}|$.
(This question is: good - bad - ugly? Difficulty 0-9:)

6: *(An infinite set can be partitioned into infinitely many subsets of infinite size)* Describe a partition of $\mathbb{N}$ that divides $\mathbb{N}$ into $\aleph_0$ countably infinite subsets.
(This question is: good - bad - ugly? Difficulty 0-9:)

7: *(Line has the same number of points as square)* Show that $|(0, 1)| = |(0, 1) \times (0, 1)|$.
(This question is: good - bad - ugly? Difficulty 0-9:)

8: Prove or disprove: If there is a injection $f : A \to B$ and a surjection $g : A \to B$, then there is a bijection $h : A \to B$.
(This question is: good - bad - ugly? Difficulty 0-9:)

9: *(Just one more point...)* Find a bijection between $(0, 1)$ and $(0, 1]$.
(This question is: good - bad - ugly? Difficulty 0-9:)