

COT 3100 Discrete Mathematics

Homework 3 Questions

February 25, 2010

This homework is **due on Friday, March 5th (only 1 week!)**. Be sure to show all steps of how you arrive at an answer.

- **Problem 1** Evaluate each of the following summations.

(a) (2 points) $\sum_{k=1}^5 (k+1)$

(b) (2 points) $\sum_{i=1}^2 \sum_{j=1}^3 (i+j)$

(c) (4 points) $\sum_{i=1}^{50} \sum_{j=i}^{50} ij$

- **Problem 2** (5 points) Let $f(x) = \frac{3x}{x+6}$, for all real $x \geq 1$. Find $f^{-1}(x)$ and state the domain and range of $f^{-1}(x)$.

- **Problem 3** Let A, B, C be finite sets and f, g be functions such that $f : A \rightarrow B$ and $g : B \rightarrow C$.

(a) (4 points) Give an example where f is surjective, g is injective, but $g \circ f$ is neither.

(b) (4 points) Prove that if $g \circ f$ is injective, then f is injective.

- **Problem 4** (3 points) Apply Euclidean Algorithm to find $\gcd(546, 495)$.

- **Problem 5** (6 points) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ and $g : \mathbb{R} \rightarrow \mathbb{R}$ be functions where $f(x) = x^2 + 1$ and $g(x) = x + 2$. Find $f \circ g$ and $g \circ f$.